Chapter 2

Arithmetic

1. In track meets both 100 yards and 100 metres are used as distances; By how many metres is 100 metres longer than 100 yards? *[1995]*
(a) 0.856 m (b) 8.56 m
(c) 0.0856 m (d) 1.0 m

2. The value of (a – m) (b – m)..... (y – m) (z – m) is *[1995]*
(a) $m^{26} + am^{25} + abm^{24} + \ldots + a.b.c \ldots z$
(b) $m^{26} - am^{25} + abm^{24} + \ldots + a.b.c \ldots z$
(c) 0
(d) indeterminate

3. Out of a total of 120 musicians in a club, 5% can play all the three instruments, guitar, violin and flute. If so happens that the number of musicians who can play any two and only two of the above instruments is 30. The number of musicians who can play the guitar alone is 40. What is the total number of those who can play violin alone or flute alone? *[1995]*
(a) 45 (b) 44
(c) 38 (d) 30

4. Zero was invented by *[1995]*
(a) Aryabhata (b) Varahamihira
(c) Bhaskara I (d) An unknown Indian

5. A person earns ₹ 2000 per month over and above his salary as additional charge allowance. However, 30% of this additional income will be deducted as additional income tax at source. If the person would deposit ₹ 1000 per month on a long term saving fetching 12% interest his tax liability on the additional allowance would reduce to 10%. What is the effective interest for this person for money invested in the long term savings scheme? *[1995]*
(a) 12% (b) 18%
(c) 19% (d) 20%

6. The average of x_1, x_2 and x_3 is 14. Twice the sum of x_2 and x_3 is 30. What is the value of x_1? *[1996]*
(a) 20 (b) 27
(c) 16 (d) 2

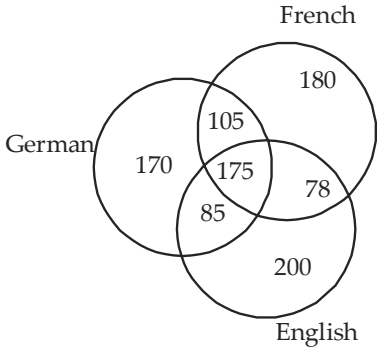
7. If the price of a television set is increased by 25%, then by what percentage should the new price be reduced to bring the price back to the original level? *[1996]*
(a) 15% (b) 25%
(c) 20% (d) 30%

8. If $A = x^2 - y^2$, $B = 20$ and $x + y = 10$, then *[1996]*
(a) A is greater than B
(b) B is greater than A
(c) A is equal to B
(d) It is not possible to compare A and B as the data provided is inadequate

9. The average monthly income of person in a certain family of 5 is ₹1000. What will be monthly average income of person in the same family if the income of one person increased by ₹12000 per year? *[1997]*
(a) ₹1200 (b) ₹1600
(c) ₹2000 (d) ₹3400

10. In a group of persons travelling in a bus, 6 persons can speak Tamil, 15 can speak Hindi and 6 can speak Gujrati. In that group none can speak any other language. If 2 persons in the group can speak two languages and one person can speak all the three languages, then how many persons are there in the group? *[1997]*
(a) 21 (b) 22
(c) 23 (d) 24

11. A survey was conducted on a samples of 1000 persons with reference to their knowledge of English, French and German. The results of the survey are presented in the given Venn diagram. The ratio of the number of the persons who do not know any of the three languages to those who know all the three language, is *[1997]*



(a) 1/27 (b) 1/25
(c) 1/550 (d) 175/1000

12. The number of times in a day the Hour-hand and the Minute-hand of a clock are at right angles, is *[1997]*
(a) 44 (b) 48
(c) 24 (d) 12

13. There are 50 students admitted to a nursery class. Some students can speak only English and some can speak only Hindi. 10 students can speak both English and Hindi. If the number of students who can speak English is 21, then how many can speak Hindi, how many can speak only Hindi and how many can speak only English? *[1998]*

(a) 21, 11 and 29 respectively
(b) 28, 18 and 22 respectively
(c) 37, 27 and 13 respectively
(d) 39, 29 and 11 respectively

14. An accurate clock shows the time as 3.00. After hour hand has moved 135°, the time would be *[1998]*

(a) 7.30 (b) 6. 30
(c) 8.00 (d) 9.30

15. A man purchases two clocks *A* and *B* at a total cost of ₹ 650. He sells A with 20% profit and B at a loss of 25% and gets the same selling price for both the clocks. What are the purchasing prices of *A* and *B* respectively? *[1998]*

(a) ₹ 225; ₹ 425 (b) ₹ 250; ₹ 400
(c) ₹ 275; ₹ 375 (d) ₹ 300; ₹ 350

16. If 15 pumps of equal capacity can fill a tank in 7 days, then how many extra pumps will be required to fill the tank in 5 days? *[1998]*

(a) 6 (b) 7
(c) 14 (d) 21

17. Out of the three annual examination, each with a total of 500 marks, a student secured average marks of 45% and 55% in the first and second annual examinations. To have an overall average of 60%, how many marks does the student need to secure in the third annual examination? *[1998]*

(a) 450 (b) 400
(c) 350 (d) 300

18. In a family, a couple has a son and daughter. The age of the father is three times that of his daughter and the age of the son is half of his mother. The wife is nine years younger to her husband and the brother is seven years older than his sister. What is the age of the mother? *[1998]*

(a) 40 years (b) 45 years
(c) 50 years (d) 60 years

19. The missing fraction in the series given below is:

$$\frac{4}{9}, \frac{9}{20}, \ldots, \frac{39}{86}$$ *[1998]*

(a) $\frac{17}{40}$ (b) $\frac{19}{42}$
(c) $\frac{20}{45}$ (d) $\frac{29}{53}$

20. If $x + 2y = 2x + y$, then x^2/y^2 is equal to *[1999]*

(a) 0 (b) 1
(c) 2 (d) 4

21. In an office, the distribution of work hours is as shown in the following table *[1999]*

Members	Work hours
5	0 - 19
1	20 - 24
25	25 - 29
40	30 - 34
15	35 - 39
8	40 - 45

Consider the following inferences drawn from the table:

1. The average number of hours worked by a staff member is about 30
2. The percentage of those who worked 3.5 or more hours is less than 25
3. At least 5 staff members worked more than 44 hours

Which of these inferences is/are valid?

(a) 1 alone (b) 2 alone
(c) 1 and 2 (d) 1, 2 and 3

22. Amar, Akbar and Anthony are friends, being looked after by a matron Farah, Amar weighs 50% more than Akbar and Anthony weighs 25% less than Amar. Farah weighs a third of the combined weight of the three boys. All four together weigh 232kg. The correct arrangement of the persons in the ascending order of their weights, is : *[1999]*

(a) Anthony, Akbar, Farah, Amar
(b) Anthony, Akbar, Amar, Farah
(c) Akbar, Anthony, Amar, Farah
(d) Akbar, Anthony, Farah, Amar

23. In the sequence of numbers 5, 8, 13, *X*, 34, 55, 89, . . ., the value of *X* is *[1999]*

(a) 20 (b) 21
(c) 23 (d) 29

24. In a town 25% families own a phone and 15% own a car. 65% families own neither a phone nor a car. 2000 families own both a phone and a car. Consider the following statements in this regard: *[1999]*

1. 10% families own both a car and a phone
2. 35% families own either a car or a phone
3. 40,000 families live in the town

Which of the above statements are correct?

(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 1, 2 and 3

25. In an examination, every candidate took Physics or Mathematics or both. 65.8% took Physics and 59.2% took Mathematics. The total number of candidates was 2000. How many candidates took both Physics and Mathematics? *[2000]*

(a) 750 (b) 500
(c) 250 (d) 125

26. A club has 108 members. Two-thirds of them are men and the rest are women. All members are married except for 9 women members. How many married women are there in the club? *[2000]*

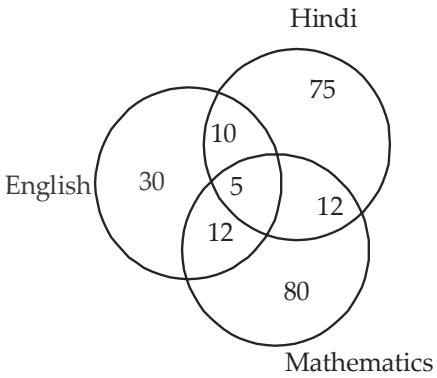
(a) 20 (b) 24
(c) 27 (d) 30

27. An accurate clock shows 8 O' clock in the morning. Throughout how many degrees will the hour hand rotate, when the clock shows 20' clock in the afternoon? *[2000]*
(a) 150° (b) 144°
(c) 168° (d) 180°

28. The monthly income of Komal and Asha are in the ratio of 4 : 3. Their monthly expenses are in the ratio of 3 : 2. However, both save ₹ 600 per month. What is their total monthly income? *[2000]*
(a) ₹ 8,400 (b) ₹ 5,600
(c) ₹ 4,200 (d) ₹ 2,800

29. If $x = -2$, then $x^3 - x^2 - x - 1$ is equal to *[2000]*
(a) 1 (b) –3
(c) –11 (d) –15

30. The given diagram shows the number of students who failed in an examination comprising papers in English, Hindi and Mathematics. The total number of students who took the test is 500. What is the percentage of students who failed in atleast two subject? *[2000]*



(a) 6.8 (b) 7.8
(c) 34 (d) 39

31. In a class there are 18 boys who are over 160 cm tall. If these boys constitute three fourths of the boys and the total number of boys is two-third of the number of students in the class, then what is the number of girls in the class? *[2000]*
(a) 6 (b) 12
(c) 18 (d) 24

32. For the system of equations $x^2 + y^2 = 34$, $x^4 - y^4 = 544$, the values of x and y are *[2001]*
(a) + 4, +, 3 (b) + 5, + 3
(c) + 3, + 5 (d) + 3, + 4

33. Water is filled in a container in such a manner that its volume doubles after every five minutes. If it takes 30 minutes for the container to be full, in how much time will it be one-fourth full? *[2001]*
(a) 7 minutes and 30 seconds
(b) 10 minutes
(c) 20 minutes
(d) 25 minutes

34. A city has a population of 3,00,000 out of which 1,80,000 are males. 50% of the population is literate. If 70% of the males are literate, the number of literate females is *[2001]*
(a) 24,000 (b) 30,000
(c) 54,000 (d) 60,000

35. In a survey, it was found that 80% of those surveyed owned a car while 60% of those surveyed owned a mobile phone. If 55% owned both a car and a mobile phone, what percent of those surveyed owned a car or a mobile phone or both? *[2001]*
(a) 65% (b) 80%
(c) 85% (d) 97.5%

36. In 1930, a person's age was 8 times that of his shown. In 1938, the father's age became ten times that of his son's age in 1930. The ages of the son and father in 1940 were respectively *[2001]*
(a) 16 years, 58 years (b) 15 years, 50 years
(c) 14 years, 42 years (d) 13 years, 34 years

37. Amit started a business by investing ₹ 30,000. Rahul joined the business after some time and invested ₹ 20,000. At the end of the year, profit was divided in the ratio of 2 : 1. After how many months did Rahul join the business? *[2002]*
(a) 2 (b) 3
(c) 4 (d) 5

38. When the time in the wall-clock is 3.25 p.m., the acute angle between the hours-hand and the minutes-hand is *[2002]*
(a) 60° (b) 52.5°
(c) 47.5° (d) 42°

39. The age of a man is three times the sum of the ages of his two sons. Five years hence, his age will be double of the sum of the ages of his sons. The father's present age is *[2002]*
(a) 40 years (b) 45 years
(c) 50 years (d) 55 years

40. In a company, 60% of the employees are men. Of these 40% are drawing more than ₹ 50,000 per year. If 36% of the total employees of the company draw more than ₹ 50,000 per year, what is the percentage of women who are drawing less than ₹ 50,000 per year? *[2002]*
(a) 70 (b) 60
(c) 40 (d) 30

41. A trader fixed the price of an article in such a way that by giving a rebate of 10% on the price fixed, he made a profit of 15%. If the cost of the article is ₹ 72, the price fixed on it, is *[2002]*
(a) ₹ 82.80 (b) ₹ 90.00
(c) ₹ 92.00 (d) ₹ 97.80

42. Three bells toll at intervals of 9, 12 and 15 minutes respectively. All the three begin to toll at 8 a.m. At what time will they toll together again? *[2003]*
(a) 8.45 a.m. (b) 10. 30 a.m.
(c) 11.00 a.m. (d) 1. 30 p.m.

43. Left pan of a faulty weight weighs 100 gram more than its right pan. A shopkeeper keeps the weight measure in the left pan while buying goods but keeps it in the right pan while selling his goods. He uses only 1 kg weight measure. If he sells his goods at the listed cost price, what is his gain? *[2005]*

(a) $\frac{200}{11}\%$ (b) $\frac{100}{11}\%$

(c) $\frac{1000}{9}\%$ (d) $\frac{200}{9}\%$

44. There are 6 person ; *A* ,*B*, *C*, *D*, *E* and *F*. *A* has 3 items more than *C*
D has 4 items less than *B*
E has 6 items less than *F*
C has 2 items more than *E*
F has 3 items more than *D*
Which one of the following figure can not be equal to the total number of items possessed by all the 6 persons? *[2005]*

(a) 41 (b) 4
(c) 53 (d) 58

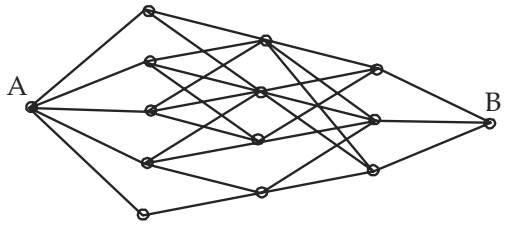
45. How many numbers are there in all from 6000 to 6999 (Both 6000 and 6999 included) having all digits same? *[2006]*

(a) 216 (b) 356
(c) 496 (d) 504

46. Each of the five persons A, B, C, D and E possesses unequal number of similar items. A, B and C possesses Twenty-one items in all, while C, D and E possess seven items in all. How many items do A and B possess in all? *[2006]*

(a) 15 (b) 17
(c) 18 (d) Data is insufficient

47. (Each small circle represents a different station)
What is the maximum number of different paths that exist between the station A and the station B? *[2007]*



(a) 28 (b) 31
(c) 33 (d) 35

48. 6 equidistant vertical lines are drawn on a board 6 equidistant horizontal lines are also drawn on the board cutting the 6 vertical lines, and the distance between any two consecutive horizontal lines is equal to that between any two consecutive vertical lines. What is the maximum number of squares thus formed? *[2007]*

(a) 37 (b) 55
(c) 126 (d) 225

49. A person has to completely put each of three liquids: 403 litres of petrol, 465 litres of diesel and 496 litres of Mobile Oil in bottles of equal size without mixing any of the above three types of liquids such that each bottle is completely filled. What is the least possible number of bottles required? *[2007]*

(a) 34 (b) 44
(c) 46 (d) None of the above

50. If all the numbers from 501 to 700 are written, what is the total number of times does the digit 6 appear? *[2007]*

(a) 138 (b) 139
(c) 140 (d) 141

51. The average salary of 100 employees in an office is ₹ 16,000 per month. The management decided to raise salary of every employee by 5% but stopped a transport allowance of ₹ 800 per month which was paid earlier to every employee. What will be the new average monthly salary? *[2007]*

(a) ₹ 16,000
(b) ₹ 16,500
(c) ₹ 16,800
(d) Cannot be known since data are insufficient

52. In the series
AABABCABCDABCDE.. .
Which letter occupies the 100th position? *[2008]*

(a) H (b) I
(c) J (d) K

53. What is the number of terms in the series 117, 120, 123,
126,....., 333? *[2008]*

(a) 72 (b) 73
(c) 76 (d) 79

54. A person purchases 100 pens at a discount of 10%. The net amount of money spent by the person to purchase the pens is ₹ 600. The selling expenses incurred by the person are 15% on the net cost price. What should be the selling price for 100 pens in order to earn a profit of 25%? *[2008]*

(a) ₹ 802.50 (b) ₹ 811.25
(c) ₹ 862.50 (d) ₹ 875

55. In an examination, 70% of the students passed in the Paper I, and 60% of the students passed in the Paper II. 15% of the students failed in both the papers while 270 students passed in both the papers. What is the total number of students? *[2008]*

(a) 600 (b) 580
(c) 560 (d) 540

56. March 1, 2008 was Saturday. Which day was it on March 1, 2002? *[2008]*

(a) Thursday (b) Friday
(c) Saturday (d) Sunday

57. There are four persons *A*, *B*, *C*, *D*; and *A* has some coins. *A* gave half of the coins to *B* and 4 more besides. *B* gave half of the coins to *C* and 4 more besides. *C* gave half of the coins to *D* and 4 more besides. Both *B* and *D* end up with same number of coins. How many coins did A have originally? *[2009]*

(a) 96 (b) 84
(c) 72 (d) 64

58. While adding the first few continuous natural numbers, a candidate missed one of the numbers and wrote the answer as 177. What was the number missed? *[2009]*

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

59. Four metal rods of lengths 78 cm, 104 cm 117 cm and 169 cm are to be cut into parts of equal length. Each part must be as long as possible. What is the maximum number of pieces that can be cut? *[2009]*
(a) 27 (b) 36
(c) 43 (d) 400

60. In an examination, there are three subjects A, B and C. A student has to pass in each subject. 20% students failed in A, 22% students failed in B and 16% failed in C. The total number of students passing the whole examination lies between *[2009]*
(a) 42% and 84% (b) 42% and 78%
(c) 58% and 78% (d) 58% and 84%

61. How many times are an hour hand and a minute hand of a clock at right angles during their motion from 1.00 p.m. to 10.00 p.m.? *[2009]*
(a) 9 (b) 10
(c) 18 (d) 20

62. There are 240 balls and n number of boxes B_1, B_2, B_3, ... B_n. The balls are to be placed in the boxes such that B_1 should contain 4 balls more than B_2, B_2 should contain 4 balls more than B_3, and so on. Which one of the following cannot be the possible value of n? *[2009]*
(a) 4 (b) 5
(c) 6 (d) 7

63. In a tournament 14 teams play league/matches. If each team plays against every other team only once then how many matches are played? *[2010]*
(a) 105 (b) 91
(c) 85 (d) 78

64. Two numbers X and Y are respectively 20% and 28% less than a third number Z. By what percentage is the number Y less than the number X ? *[2010]*
(a) 8% (b) 9%
(c) 10% (d) 12%

65. How many numbers from 0 to 999 are ***not*** divisible by either 5 or 7 ? *[2010]*
(a) 313 (b) 341
(c) 686 (d) 786

66. In a group of five persons A, B, C, D and E, there is a professor, a doctor and lawyer. A and D are unmarried ladies, and do not work. Of the married couple in the Group, E is the husband. B is the brother of A and is neither a doctor nor a lawyer. Who is the professor? *[2010]*
(a) B (b) C
(c) A (d) None of these

67. Half of the villagers of a certain village have their own houses. One-fifth of the villagers cultivate paddy. One-third of the villagers are literate. Four-fifth of the villagers are below twenty five. Then, which one of the following is certainly true? *[2010]*
(a) All the villagers who have their own houses are literate
(b) Some villagers under twenty five are literate
(c) A quarter of the villagers who have their own houses cultivate paddy
(d) Half of the villagers who cultivate paddy are literate

68. Each person's performance compared with all other persons is to be done to rank them subjectively. How many comparisons are needed in total, if there are 11 persons? *[2010]*
(a) 66 (b) 55
(c) 54 (d) 45

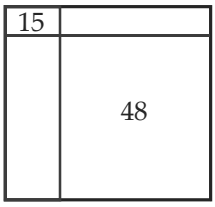
69. A man fills a basket will eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 24 day. After how many days the basket was $\frac{1}{4}$th full? *[2010]*
(a) 6 (b) 12
(c) 17 (d) 22

70. The difference between the simple interest received from two banks on ₹500 for two years is ₹ 2.50. What is the difference between their rates? *[2010]*
(a) 0.25% (b) 0.5%
(c) 1 % (d) 2.5%

71. A candidate attempted 12 questions and secured full marks in all of them. If he obtained 60% in the test and all questions carried equal marks, then what is the number of questions in the test? *[2010]*
(a) 36 (b) 30
(c) 25 (d) 20

72. A contract on construction job specifies a penalty for delay in completion of the work beyond a certain date is as follows: ₹ 200 for the first day, ₹ 250 for the second day, ₹ 300 for the third day etc., the penalty for each succeeding day being ₹ 50 more than that of the preceding day. How much penalty should the contractor pay if he delays the work by 10 days? *[2011 - II]*
(a) ₹ 4950 (b) ₹ 4250
(c) ₹ 3600 (d) ₹ 650

73. Consider the following figure and answer the item that follows:



A square is divided into four rectangles as shown above. The lengths of the sides of rectangles are natural numbers. The areas of two rectangles are indicated in the figure. What is the length of each side of the square? *[2011 - II]*
(a) 10
(b) 11
(c) 15
(d) Cannot be determined as the given data are insufficient

74. A person has only ₹ 1 and ₹ 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is ₹ 75, then the number of ₹ 1 and ₹ 2 coins are, respectively *[2011 - II]*
(a) 15 and 35 (b) 35 and 15
(c) 30 and 20 (d) 25 and 25

75. Three persons start walking together and their steps measure 40 cm, 42 cm and 45 cm respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps ? *[2011 - II]*
(a) 25 m 20 cm (b) 50 m 40 cm
(c) 75 m 60 cm (d) 100 m 80 cm

76. A student on her first 3 tests received an average score of N points. If she exceeds her previous average score by 20 points on her fourth test, then what is the average score for the first 4 tests ? *[2011 - II]*
(a) N + 20 (b) N + 10
(c) N + 4 (d) N + 5

77. In a group of persons, 70% of the persons are male and 30% of the persons are married. If two-sevenths of the males are married, what fraction of the females is single ? *[2011 - II]*
(a) 2/7 (b) 1/3
(c) 3/7 (d) 2/3

78. In a rare coin collection, there is one gold coin for every three non-gold coins. 10 more gold coins are added to the collection and the ratio of gold coins to non-gold coins would be 1 : 2. Based on the information, the total number of coins in the collection now becomes *[2013 - II]*
(a) 90 (b) 80
(c) 60 (d) 50

79. A gardener has 1000 plants. He wants to plant them in such a way that the number of rows and the number of columns remains the same. What is the minimum number of plants that he needs more for this purpose? *[2013 - II]*
(a) 14 (b) 24
(c) 32 (d) 34

80. A sum of ₹ 700 has to be used to give seven cash prizes to the students of a school for their overall academic performance. If each prize is ₹ 20 less than its preceding prize, what is the least value of the prize? *[2013 - II]*
(a) ₹ 30 (b) ₹ 40
(c) ₹ 60 (d) ₹ 80

81. Out of 120 applications for a post, 70 are male and 80 have a driver's license. What is the ratio between the minimum to maximum number of males having driver's license? *[2013 - II]*
(a) 1 to 2 (b) 2 to 3
(c) 3 to 7 (d) 5 to 7

82. In a garrison, there was food for 1000 soldiers for one month. After 10 days, 1000 more soldiers joined the garrison. How long would the soldiers be able to carry on with the remaining food? *[2013 - II]*
(a) 25 days (b) 20 days
(c) 15 days (d) 10 days

83. The tank-full pertrol in Arun's motor-cycle lasts for 10 days. If he starts using 25% more everyday, how many days will the tank-full pertrol last? *[2013 - II]*
(a) 5 (b) 6
(c) 7 (d) 8

84. There are some balls of red, green and yellow colour lying on a table. There are as many red balls as there are yellow balls. There are twice as many yellow balls as there are green ones. The number of red balls. *[2013 - II]*
(a) is equal to the sum of yellow and green balls
(b) is double the number of green balls.
(c) is equal to yellow balls minus green balls.
(d) cannot be ascertained.

85. For a charity show, the total tickets sold were 420. Half of these tickets were sold at the rate of ₹ 5 each, one-third at the rate of ₹ 3 each and the rest for ₹ 2 each. What was the total amount received? *[2014 - II]*
(a) ₹ 900 (b) ₹ 1,540
(c) ₹ 1,610 (d) ₹ 2,000

86. If Sohan, while selling two goats at the same price, makes a profit of 10% on one goat and suffers a loss of 10% on the other *[2014 - II]*
(a) he makes no profit and no loss.
(b) he makes a profit of 1%.
(c) he suffers a loss of 1%.
(d) he suffers a loss of 2%.

87. Five persons fire bullets at a target at an interval of 6, 7, 8, 9 and 12 seconds respectively. The number of times they would fire the bullets together at the target in an hour is *[2014 - II]*
(a) 6 (b) 7
(c) 8 (d) 9

88. A bell rings every 18 minutes. A second bell rings every 24 minutes. A third bell rings every 32 minutes. Ifall the three bells ring at the same time at 8 o'clock in the morning, at what other time will they all ring together? *[2014 - II]*
(a) 12 : 40 hrs (b) 12 : 48 hrs
(c) 12 : 56 hrs (d) 13 : 04 hrs

89. As per agreement with a bank, a businessman had to refund a loan in some equal instalments without interest. After paying 18 instalments he found that 60 percent of his loan was refunded. How many instalments were there in the agreement ? *[2014 - II]*
(a) 22 (b) 24
(c) 30 (d) 33

90. A person X has four notes of Rupee 1, 2, 5 and 10 denomination. The number of different sums of money she can form from them is *[2010]*
(a) 16 (b) 15
(c) 12 (d) 8

91. There are 100 students in a particular class. 60% students play cricket, 30% student play football and 10% students play both the games. What is the number of students who play neither cricket nor football ? *[2011 - II]*
(a) 25 (b) 20
(c) 18 (d) 15

92. Each of A, B, C and D has ₹ 100. A pays ₹ 20 to B, who pays ₹ 10 to C, who gets ₹ 30 from D. In this context, which one of the following statements is not correct? *[2015-II]*
(a) C is the richest
(b) D is the poorest.
(c) C has more than what A and D have together.
(d) B is richer than D

93. In a town, 45% population read magazine A, 55% read magazine B, 40% read magazine C, 30% read magazines A and B, 15% read magazines B and C, 25% read magazines A and C; and 10% read all the three magazines. What percentage do not read any magazine? *[2015-II]*
(a) 10% (b) 15%
(c) 20% (d) 25%

94. Two equal glasses of same type are respectively 1/3 and 1/4 full of milk. They are then filled up with water and the contents are mixed in a pot. What is the ratio of milk and water in the pot? *[2015-II]*
(a) 7 : 17 (b) 1 : 3
(c) 9 : 21 (d) 11 : 23

95. In a test, a candidate attempted only 8 questions and secured 50% marks in each of the questions. If he obtained a total of 40% in the test and all questions in the test carried equal marks, how many questions were there in the test? *[2015-II]*
(a) 8 (b) 10
(c) 15 (d) 16

96. A father is nine times as old as his son and the mother is eight times as old as the son. The sum of the father's and the mother's age is 51 years. What is the age of the son ? *[2015-II]*
(a) 7 years (b) 5 years
(d) 4 years (d) 3 years

97. The monthly incomes of Peter and Paul are in the ratio of 4 : 3. Their expenses are in the ratio of 3 : 2. If each saves ₹ 6,000 at the end of the month, their monthly incomes respectively are (in ₹) *[2015-II]*
(a) 24,000 and 18,000
(b) 28,000 and 21,000
(c) 32,000 and 24,000
(d) 34,000 and 26,000

DIRECTIONS (Qs. 98-99) : *Read the following passage and answer the 2 (two) items that follow:*

A, B, C, D, E and F are cousins. No two cousins are of the same age, but all have birthdays on the same day of the same month. The youngest is 17 years old and the oldest E is 22 years old. F is somewhere between B and D in age. A is older than B. C is older than D. A is one year older than C. *[2015-II]*

98. Which one of the following is possible?
(a) D is 20 years old
(b) F is 18 years old
(c) F is 19 years old
(d) F is 20 years old

99. What is the number of logically possible orders of all six cousins in terms of increasing age?
(a) 1 (b) 2
(c) 3 (d) 4

100. A cow costs more than 4 goats but less than 5 goats. If a goat costs between ₹ 600 and ₹ 800, which of the following is a most valid conclusion? *[2015-II]*
(a) A cow costs more than ₹ 2,500.
(b) A cow costs less than ₹ 3,600.
(c) A cow costs between ₹ 2,600 and ₹ 3,800.
(d) A cow costs between ₹ 2,400 and ₹ 4,000.

101. Candidates in a competitive examination consisted of 60% men and 40% women. 70% men and 75% women cleared the qualifying test and entered the final test where 80% men and 70% women were successful.
Which of the following statements is correct? *[2015-II]*
(a) Success rate is higher for women.
(b) Overall success rate is below 50%.
(c) More men cleared the examination than women.
(d) Both (a) and (b) above are correct.

HINTS & SOLUTIONS

1. **(b)** 1 yard = 36 inches

1 inch = 2.54 cm

$\therefore$ 1 yard = 2.54 × 36 cm

$\therefore$ $100 \text{ yard} = \frac{2.54 \times 36}{100} \times 100 = 91.44$ m.

Difference (100m – 100 yards) = (100 – 91.44)m = 8.56 m.

2. **(c)** $(a-m)(b-m)(c-m) \ldots\ldots (m-m) \ldots\ldots (z-m) = 0$

$(\because (m-m) = 0)$

3. **(b)** Total number of musicians = 120

Number of musicians who can play all the three instruments $= 5\%$ of $120 = \frac{5}{100} \times 120 = 6$

Number of musicians who can play any two or only two of three instruments = 30

Number of the musicians who can play the guitar alone = 40

Now the number of musicians who can play violin alone or flute alone = Total number of musician – the number of musicians in all three categories = 120 – (30 + 40 + 6)

= 120 – 76 = 44

4. **(d)** Braham Gupta was the first mathematician who recognised zero as a number. But it is not clear who was that Indian, the inventor of zero.

5. **(b)**

6. **(b)** $\frac{x_1 + x_2 + x_3}{3} = 14$

$x_2 + x_3 = 42 - x_1$ .....(i)

$2(x_2 + x_3) = 30$

$x_2 + x_3 = 15$ .....(ii)

Putting (i) in (ii), $x_1 = 27$

7. **(c)** Let the original price be x.

$$\text{Increased price} = x\left(1 + \frac{25}{100}\right) = \frac{5x}{4}$$

Reduction in price to bring it back to its original value

$$= \frac{5x}{4} - x = \frac{x}{4}$$

$$\% \text{ Reduction} = \frac{(x/4)}{(5x/4)} \times 100 = 20\%$$

8. **(d)** $A = x^2 - y^2 = (x+y)(x-y) = 10(x-y)$

$B = 20$

Now, it is not possible to compare A and B, as the value of x and y is not known.

9. **(a)** Total income of the family per month

= 5 × 1000 = ₹5000 per month

Increased amount = $\frac{12000}{12}$ = ₹1000 per month

Now total amount of the family per month = ₹6000

So the average income of the family per month (after increasing) = $\frac{6000}{5}$ = ₹1200

10. **(d)** Total number of Hindi, Tamil and Gujrati speaking people = 15 + 6 + 6 = 27

Two persons of this group can speak 2 languages while one can speak 3 languages.

The third person who knows 3 languages can also speak 2 languages.

He should not be called on two places

Hence, number persons = 27 – 3 = 24

11. **(b)** Total number of persons who know only English or french or German = 170 + 180 + 200 = 550

Number of persons who know any two languages = 105 + 85 + 78 = 268

Number of persons who know all the three languages = 175

$\therefore$ Number of persons who know any of the language = 550 + 268 + 175 = 993

Number of persons who do not know any of the language = 1000 – 993 = 7

$\therefore$ Required ratio = $\frac{7}{175} = \frac{1}{25}$

12. **(b)** No. of right angles in one hour = 2

$\therefore$ No. of right angles in 24 hours = 24 × 2 = 48

13. **(d)** Number of students who speak only English = (Number of students who speak English – Number of students who speak both Hindi and English)

= 21 – 10 = 11

Number of students who speak Hindi = (Total no of students – No of students who speak only English)

= 50 – 11 = 39

$\therefore$ Number of students who speak only Hindi = (Number of Hindi speaking students – no of students who speak both languages) = 39 – 10 = 29

14. (a) Hour hand covers an angle of 360° in 12 hours.

$\therefore$ Time taken to cover an angle of 135° $= \frac{12}{360} \times 135 = 4.5$ h

$\therefore$ Required time = 3 + 4.5 = 7.5 = 7:30

15. (b) Let the cost price of clocks A and B be 'a' and $(650-a)$ respectively.

Selling price for A = Selling price for B

$$a\left(1+\frac{20}{100}\right) = (650-a)\left(1-\frac{25}{100}\right)$$

$$\left(\frac{120a}{100}\right) = (650-a)\left(\frac{75}{100}\right)$$

$$a = 250$$

Cost price for B = 650 – 250 = 400

16. (a) No. of pumps required to fill a tank in 7 days = 15

$\therefore$ No. of pumps required to fill a tank in 1 day

$= 15 \times 7 = 105$ .....(i)

Let the extra pumps required be n.

Now, no of pumps required to fill the tank in 1 day

$= (n + 15)\ 5$ .....(ii)

From (i) and (ii),

$(n + 15)\ 5 = 105$

$n + 15 = 21$

$n = 6$

17. (b) Let the average marks in the third Annual examination be x.

Total marks = (Marks in first + second + third) Annual examination

$$3(60)\left(\frac{500}{100}\right) = \left(\frac{45}{100}\right)(500) + \left(\frac{55}{100}\right)(500) + \left(\frac{x}{100}\right)(500)$$

$3(60) = 45 + 55 + x$

$x = 80$

$\therefore$ Average marks in the third annual examination

$$= \left(\frac{80}{100}\right)(500) = 400$$

18. (d) Let the mother's age be y years.

$\therefore$ The age of father = $(y + 9)$ years

The age of son = $\frac{y}{2}$ years

The age of daughter = $\left(\frac{y}{2} - 7\right)$ years

Now according to the given condition,

$$(y + 9) = 3\left(\frac{y}{2} - 7\right)$$

$$\Rightarrow \quad y + 9 = \frac{3y - 42}{2}$$

$$\Rightarrow \quad 2y + 18 = 3y - 42$$

$$\Rightarrow \quad y = 60 \text{ years}$$

19. (b) Given pattern :

$$\frac{4\times2+1}{9\times2+2}; \frac{9\times2+1}{20\times2+2}, \frac{19\times2+1}{42\times2+2}, \frac{39}{86}$$

20. (b) $2x + y = x + 2y$

$x = y$

Now, $\frac{x^2}{y^2} = \frac{x^2}{x^2} = 1$

21. (c) Average number of hours =

$$\frac{5(17)+1(22)+25(27)+40(32)+15(37)+8(42.5)}{5+1+25+40+15+8}$$

$$= \frac{2957}{94} = 30$$

Number of persons who worked 35 or more hours = 18 + 8 = 23

$\therefore$ % of such persons $= \frac{23}{94} \times 100 = 24.468 < 25$

So, Inference 1 and 2 are valid

22. (d) Let weight of Akbar = x kg.

then weight of Amar = $\frac{3x}{2}$ kg

and weight of Anthony = $\left(\frac{3x}{2} - \frac{3x}{4\times2}\right) = \frac{9x}{8}$ kg.

Hence weight of Farah = $\frac{1}{3}\left(x + \frac{3x}{2} + \frac{9x}{8}\right) = \frac{29x}{24}$ kg

According to question

$$x + \frac{3x}{2} + \frac{9x}{8} + \frac{29x}{24} = 232$$

$$\Rightarrow \quad \frac{29x}{8} + \frac{29x}{24} = 232$$

$$\Rightarrow \quad 116x = 5568$$

$$\Rightarrow \quad x = 48$$

$\therefore$ Amar's weight = $\frac{3}{2}(48) = 72$ kg

Anthony's weight = $\frac{3}{2}(48)\left(1 - \frac{1}{4}\right) = 54$ kg

Akbar's weight = 48 kg

and Farah's weight = $\frac{29}{24} \times 48 = 58$ kg

$\therefore$ Arrangement of persons in the ascending order : Akbar < Anthony < Farah < Amar.

23. **(b)** Given pattern :
A number is obtained by summation of previous two numbers.
$13 = 8 + 5$, $X = 8 + 13 = 21$, $21 + 34 = 55$ and so on.

24. **(c)** Suppose x% families own both a car and a phone, then percentage of the families owing only a phone = $25 - x$
Percentage of the families owing only a car = $15 - x$
$\therefore$ Now, $(25 - x) + (15 - x) + x + 65 = 100$
$x = 5$
Percentage of families who have either a car or a phone
$= (25 - 5) + (15 - 5) + 5 = 35$
So statement (2) is correct.
Let the total number of families in the town be y.

$$\therefore \quad x\% \text{ of } y = \frac{5 \times y}{100} = 2000$$

$$y = 40000$$

So statement (3) is also correct.

25. **(b)** Let x% candidates take both the subjects.
Percentage of candidates who opted for Physics = 65.8% and Percentage of candidates who opted for Mathematics = 59.2%
$\therefore$ $x = (65.8 + 59.2 - 100)\%$
$= (125 - 100)\% = 25\%$
Now, total number of candidates = 2000
$\therefore$ Number of candidates who opted for both the subjects

$$= 25\% \text{ of } 2000 = \frac{25 \times 2000}{100} = 500$$

26. **(c)** No. of women $= \frac{1}{3}(108) = 36$
$\therefore$ No. of unmarried women = No of women – No of unmarried women = 36 – 9 = 27

27. **(d)** Angle made by hour hand for 12 hours = 360°

$$\text{Angle made by hour hand for 1 hour} = \frac{360^\circ}{12}$$

$$\therefore \text{ Angle made by hour hand for 6 hours} = \frac{360^\circ}{12}(6) = 180^\circ$$

28. **(c)** Let monthly income of Komal and Asha be $4x$ and $3x$
Also, let monthly expenses of Komal and Asha be $3y$ and $2y$.
Now, $4x - 3y = 600$ .....(i)
$3x - 2y = 600$ .....(ii)
Solving (i) and (ii), $x = 600$ and $y = 600$
$\therefore$ Total monthly income = $(4 + 3)(600) = ₹ 4200$

29. **(c)** $(-2)^3 - (-2)^2 - (-2) - 1 = -11$

30. **(b)** No. of students who failed in Hindi and English = 10
No. of students who failed in English and Maths = 12
No. of students who failed in Maths and Hindi = 12
No. of students who failed in Maths, English and Hindi = 5
$\therefore$ Total No. of students who failed in atleast two subjects = No. of students failed in any two subjects + No. of students failed in 3 subjects $= 10 + 12 + 12 + 5 = 39$
$\therefore$ % of students failed in atleast 2 subjects

$$= \frac{39}{500} \times 100 = 7.8$$

31. **(b)** Let the total No. of boys be n.
Now, number of boys above 160 cm height = 18

$$\frac{3}{4}n = 18$$

$$n = 24$$

Also, let total no. of students be N.

$$\text{Then, } \frac{2}{3}N = 24$$

$$N = \frac{3}{2}(24) = 36$$

$\therefore$ Number of girls = $N - n = 36 - 24 = 12$

32. **(b)** The given equations are
$x^2 + y^2 = 34$ .....(i)
$x^4 - y^4 = 544$
$(x^2)^2 - (y^2)^2 = 544$
$(x^2 + y^2)(x^2 - y^2) = 544$ .....(ii)
Putting value of (i) in (ii),
$34(x^2 - y^2) = 544$
$x^2 - y^2 = 16$
Now, checking it with the given options, only $x = 5$ and $y = 3$ satisfies it.

33. **(c)** Container is filled in 30 min.
$\therefore$ Container is half-filled in $(30 - 5) = 25$ min
Hence, time taken for the container to be one-fourth filled = $(25 - 5) = 20$ min.

34. **(a)** Literate population $= \frac{50}{100}(300000) = 150000$

$$\text{Male literate population} = \frac{70}{100}(180000) = 126000$$

$\therefore$ Literate female population = 150000 – 126000 = 24000

35. **(c)** Percentage of car owners = 80%
Percentage of mobile phone owners = 60%
Percentage having both car and mobile phone = 55%
Percentage of having only car = 80 – 55 = 25%
Percentage of having mobile phone = 60 – 55 = 5%
Percentage of having a car or a mobile phone or both
= 55% + 25% + 5%
= 85%

36. **(c)** Let son's age in 1930 be x years
then father's age in 1930 will be $8x$ years
In 1938, father's age= $(8x + 8)$ years
As per the question, $8x + 8 = 10x$
$\therefore \quad 2x = 8$
or $\quad x = 4$ years
Hence son's age in 1930 = 4 years
Father's age in 1930 = 8(4) = 32
Therefore, the age of son and father in 1940 will be 14 years and 42 years respectively.

37. **(b)** Let after 't' months Rahul joined the business. Hence Amit does business for 1 year and Rahul for $(12 - t)$ months.
They will share the profit in ratio
$30000 \times 12 : 20000 \times (12 - t) = 2 : 1$

$$\Rightarrow \frac{360000}{240000 - 20000t} = \frac{2}{1}$$

$$\Rightarrow 40000t = 480000 - 360000$$

$$\Rightarrow 40000t = 120000$$

$$t = 3 \text{ months}$$

38. **(c)** In a clock, the angle between two successive numbers is $360° \div 12 = 30°$. When the time is 3.25 pm, the minute hand will be on 5 and will have moved 60° from 3 and hour hand would be between 3 and 4 and as it moves 30° in 60 minutes, so in 25 minutes, it would move $\frac{30° \times 25}{60} = 12.50$.

So the difference between two hands will be
$= 60° - 12.5° = 47.5°$

39. **(b)** Let the father's present age be x and son's age be x_1 and x_2.
Now, $\quad x = 3(x_1 + x_2)$ .....(i)
Also, $\quad x + 5 = 2(x_1 + 5 + x_2 + 5)$
$\quad x + 5 = 2(x_1 + x_2 + 10)$ .....(ii)

Putting value of $(x_1 + x_2) = \frac{x}{3}$ from (i) in equation (ii)

$$x + 5 = 2\left(\frac{x}{3} + 10\right)$$

$$x = 45$$

40. **(a)** Let total number of employees be 100

$$\text{Number of men} = \frac{60 \times 100}{100} = 60$$

$$\text{and number of women} = \frac{40 \times 100}{100} = 40$$

Number of men drawing more than ₹ 50000

$$= \frac{40 \times 60}{100} = 24 \text{ men}$$

Since number of total employees drawing more than

$$₹\ 50000 = \frac{36 \times 100}{100} = 36$$

Number of women who draw more than ₹ 50000
$= 36 - 24 = 12$
Number of women who draw less than ₹ 50000
$= 40 - 12 = 28$
Percentage of women who draw less than ₹ 50,000 per year $= \frac{28 \times 100}{40} = 70\%$

41. **(c)** Selling price = Cost price (1 + % Gain)
= Marked price (1 – % Discount)

$$\text{Marked price} = \frac{\text{Cost price}(1 + \%\text{Gain})}{(1 - \%\text{Discount})}$$

$$= \frac{72(1.15)}{(0.90)} = 92$$

42. **(c)** Bells will toll together again at a time, which is obtained by taking L.C.M. of their individual tolling intervals.
L.C.M. of 9, 12 and 15 = 180 min
They will toll together again after 180 min, i.e. 3 hours.
Time = 8 + 3 = 11 a.m.

43. **(a)** Let the purchased amount be 1100 kg and the cost price of 1100 kg be ₹ x.
Therefore, he pays for 1000 kg and buys 1100 kg.

$$\text{Cost price of 1000 kg} = ₹\ \frac{10}{11}x$$

$$\text{Therefore, net profit} = ₹\ \frac{x}{11}$$

Similarly while selling, if he sells 1000 kg. He would actually be selling 900 kg at the price of 1000 kg.

Similarly, once again the profit would be ₹ $\frac{x}{11}$

$$\text{Therefore, total profit} = ₹\ \frac{2x}{11}$$

$$\text{In terms of percentage, this would be } \frac{200}{11}\%$$

44. **(c)** $A = C + 3, \quad D = B - 4, \quad E = F - 6$
$C = E + 2, \quad F = D + 3$
On adding, we get $A = B - 2$
Total number of items $= A + B + C + D + E + F$
$= A + (A + 2) + (A - 3) + (A - 2) + (A - 5) + (A + 1)$
$= 6A - 7$
If $A = 8$, Total number of items $= 8 \times 6 - 7 = 41$
For $A = 9$, Total number of items $= 9 \times 6 - 7 = 47$
For $A = 10$, Total number of items $= 10 \times 6 - 7 = 53$

45. **(c)** Total numbers between 6000 to 6999 = 1000. Now, when all the digits are different, then thousands place is always to be filled by 6, next place by any of the remaining 9 digits and the remaining two places by any of the 8 and 7 digits respectively. So, total no. of numbers, when all digits are different = 9 × 8 × 7 = 504.

Hence, total no. of numbers, where all digits are same
total numbers — numbers where digits are different
= 1000 – 504 = 496

46. **(b)** As, A + B + C = 21(I)

and C + D + E = 7 (II)

For equation (II), 'c' can take values

1, 2 and 4 as 1 + 2 + 4 = 7.

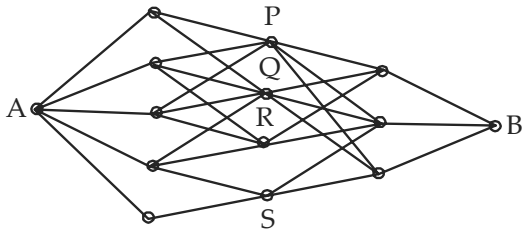
For C = 1, A + B + 1 = 21

A + B = 20

Similarly for C = 2, A + B = 21 – 2 = 19

and for C = 4, A + B = 21 – 4 = 17

47. **(b)** There are 4 routes between A to B, via P, Q, R and S



Case I : route via P →

A to P = 3 and P to B = 3

∴ routes via P = 3 × 3 = 9

Case II : A to Q = 4 and Q ot B = 3

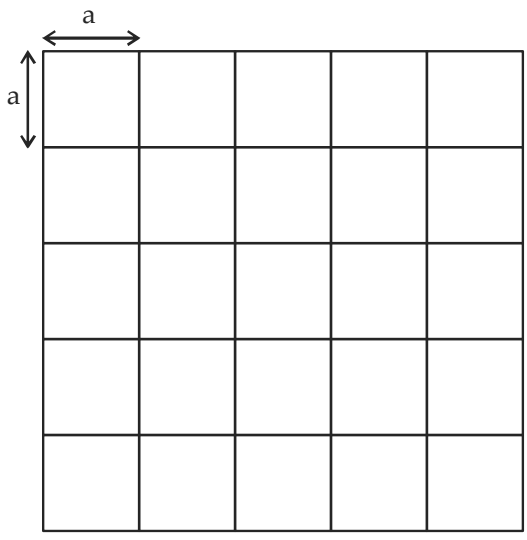
∴ routes via Q = 4 × 3 = 12

Case III : similarly, routes via R = 3 × 2 = 6

Case IV : routes via S = 2 × 2 = 4

∴ Total number of routes = 9 + 12 + 6 + 4 = 31

48. **(b)**



There can be 5 type of squares thus formed.

Case I : Single square boxes.

Single square boxes along a horizontal row = 5

Single square boxes along a vertical row = 5

Number of single square boxes = 5 × 5 = 25

Case II : Double square boxes = double square box along horizontal X double square box along vertical = 4 × 4 = 16

Case III : Triple square boxes = 3 × 3 = 9

Case IV : Squares with 4 square boxes = 2 × 2 = 4

Case V : Squares with 5 square boxes = 1 × 1 = 1

∴ Total number of squares = 25 + 16 + 9 + 4 + 1 = 55

49. **(b)** Maximum capacity of each bottle can be found by taking the H.C.F of the three given liquids.

Maximum capacity of each bottle = HCF of 403, 465 and 496 = 31

Number of bottles for 403 ℓ of petrol = $\frac{403}{31}$ = 13

Number of bottles for 465 ℓ of diesel = $\frac{465}{31}$ = 15

Number of bottles for 496 ℓ of mobile oil = $\frac{496}{31}$ = 16

Hence, total number of bottles = 13 + 15 + 16 = 44

50. **(c)** For number between 600 to 700 :

Number of 6 at the units place = 10

Number of 6 at the tens place = 10

Number of 6 at the hundredth place = 100

For number between 501 to 599 :

Number of 6 at the units place = 10

Number of 6 at the tens place = 10

Hence, total number of 6 between (501 – 700)
= 10 + 10 + 100 + 10 + 10 = 140

51. **(c)** Since, salary of each employee is increased by 5%, so net average increase in salary = 5%.

∴ New average monthly salary

$$= 16000\left(1+\frac{5}{100}\right) = 16800$$

As transport allowance is not a part of the salary, so deduction of ₹ 800 will have no effect on the new average salary.

52. **(b)** $\overset{1}{\underline{A}}\ \overset{2}{\underline{AB}}\ \overset{3}{\underline{ABC}}\ \overset{4}{\underline{ABCD}}\ \overset{5}{\underline{ABCDE}}$.....

Given series contains 1, 2, 3, 4 ..... alphabets from the beginning. So upto 13th term, number of alphabets

$$= \frac{13(13+1)}{2} = 91$$

Again it will start from alphabet A and thus 100 th alphabet will be I.

53. **(b)** 117, 120, 123, 126, ..., 333

Given series is an A.P series with first term,

a = 117, last term ℓ =333 and common difference, d = 3

last term, ℓ = a + (n – 1)d

where, n = number of terms.

117 + (n – 1)3 = 333

(n – 1)3 = 216

n = 73

54. **(c)** Cost price = Money spent by the person to purchase + selling expenses

$$600 + \left(600 \times \frac{15}{100}\right) = 690$$

Hence, selling price = $690\left(1 + \frac{25}{100}\right) = 862.50$

55. **(a)** % of students failed in paper I = 100 – 70 = 30%

% of students failed in paper II = 100 – 60 = 40%

total % of students who failed = 30 + 40 – 15 = 55%

total % of students who passed in both papers 100 – 55 = 45%

Let, total number of students be x.

Now, 45% of x = 270

$$\frac{45 \times x}{100} = 270$$

$$x = 600$$

56. **(b)** In a year, number of weeks = 52

extra day = 1

From 2002 to 2008, there are 6 years.

So number of extra days = 6 (1) = 6

While 2004 and 2008 are leap years, having one more extra day apart from the normal extra day.

Thus, number of extra days = 6 + 1 + 1 = 8

Out of these 8 extra days, 7 days form a week and so 1 day remains.

Hence, March 1, 2002 is 1 day less then March 1, 2008 i.e., it is Friday.

57. **(c)** Let A contains x coins.

$$B = \frac{x}{2} + 4$$

$$C = \frac{1}{2}\left(\frac{x}{2} + 4\right) + 4$$

$$B_{left} = \text{coins left with B} = \left(\frac{x}{2} + 4\right) - \frac{1}{2}\left(\frac{x}{2} + 4\right) - 4$$

$$= \frac{1}{2}\left(\frac{x}{2} + 4\right) - 4 = \frac{x}{4} - 2$$

$$D = \frac{1}{2}\left[\frac{1}{2}\left(\frac{x}{2} + 4\right) + 4\right] + 4 = \frac{x}{8} + 7$$

Now, $B_{left} = D$

$$\frac{x}{4} - 2 = \frac{x}{8} + 7$$

$$\frac{x}{8} = 9$$

$$x = 72$$

58. **(c)** Let there be n natural numbers and 'x' be the number missed out.

Now, $\frac{n(n+1)}{2} - x = 177$

$n\,(n + 1) - 2x = 354$

$n\,(n + 1) = 354 + 2x$

Out of the given options only x = 13 satisfies it, as 19 (19 + 1) = $n\,(n + 1)$ = 354 + 2 (13) = 380

59. **(b)** Since each rod must be cut into parts of equal length and each part must be as long as possible, so HCF should be taken.

HCF of 78, 104, 117 and 169 = 13.

No. of parts from 78cm. rod = $\frac{78}{13} = 6$

No. of parts from 104 cm. rod = $\frac{104}{13} = 8$

No. of parts from 117 cm. rol = $\frac{117}{13} = 9$

No. of parts from 169 cm. rod = $\frac{169}{13} = 13$.

$\therefore$ Maximum no. of pieces = 6 + 8 + 9 + 13 = 36

60. **(a)** Pass % is minimum when failure % is maximum.

Maximum % of failure = 20 + 22 + 16 = 58%

$\therefore$ Minimum pass % = 100 – 58 = 42%

Now, pass % is maximum, when failure % is minimum.

Minimum % of failure = 16%

($\because$ 22 % failure covers both 16% and 20% i.e, 22% is the minimum value of failure %).

$\therefore$ Maximum % of passing = 100 – 16 = 84%

Hence, pass % range = 42% to 84%.

61. **(c)** In one hour, hour hand and minute hand are at right angles 2 times.

Time = 10 p.m – 1 p.m = 9 hr.

$\therefore$ No. of times, when both hands are perpendicular to each other in 9 hr = 9 × 2 = 18

62. (d) Since, common difference between no.of balls in box is 4, so it can be taken as an A.P. series.

$B_1 - B_2 = B_2 - B_3 \ldots\ldots\ldots = 4$

Total no. of balls = 240

$B_1 + B_2 + \ldots\ldots + B_n = 240$

$\frac{n}{2}[2a + (n-1)d] = 240 \quad (\because d = B_2 - B_1 = -4)$

$n[2a - (n-1)\,4] = 480$

$2a - (n-1)4 = \frac{480}{n}$

As L.H.S of this equation given an integer value so R.H.S must be an integer and thus 480 should be divisible by n. Out of the given options, 480 is not divisible by 7 only.

63. (b) lst team can play with rest of the 13, 2nd team can play with the remaining 12 and so on.

Hence, total no. of matches = 13 + 12 + ... + 1

$= \frac{13(13+1)}{2} = 91$

64. (c) Let value of Z be 100

Then, $X = Z - 20 = 100 - 20 = 80$

$Y = Z - 28 = 100 - 28 = 72$

$\therefore \frac{Y - X}{X}(100) = \frac{72 - 80}{80} \times 100 = -10\ \%$

Hence, Y is 10% less than the number X.

65. (c) Numbers from (0 – 999) divisible by 7,

$\frac{999}{7} = 142\frac{5}{7} \approx 142$

Numbers from (0 – 999) divisible by 5,

$\frac{999}{5} = 199\frac{4}{5} \approx 199$

There are few numbers which are divisible by both 5 and 7, i.e., by 35.

Numbers from (0 – 999) divisible by 35,

$\frac{199}{35} = 28\frac{19}{35} = 28$

Numbers divisible by 5 or 7 = 142 + 199 – 28 = 313

Hence, total numbers between (0 – 999) not divisible by 5 or 7 = 999 – 313 = 686

66. (a) As, A and D do not work, so any of B, C or E could be the professor, doctor or lawyer. Now, B is neither a doctor or lawyer, so clearly B is the professor.

67. (b) **Own housepaddy literate (< 25)**

$\frac{x}{2}\ \ \frac{x}{5}\ \ \frac{x}{3}\ \ \frac{4}{5}x$

where, x = total no. of villagers.

All the villagers who have their own houses are 50, while no. of literate villagers are 33, so (a) is not true.

No. of villagers under 25 is 80, while literate are 33, so clearly some of them under 25 are literate.

Thus, option (b) is correct.

Similarly (c) and (d) also, are not true.

68. (b) lst person is to be compared with the other 10 persons i.e 10 comparison. 2nd person is to be compared with the remaining 9 persons and so on.

Hence, total no. of comparison = 10 + 9 + ... + 1

$= \frac{10(10+1)}{2} = 55$

69. (d) Let x be the no. of eggs already present in the basket. Then, no. of eggs on each successive days:

$x, 2x, 4x, 8x, \ldots\ldots\ldots$ upto 24 days.

From here, we can see that number of eggs are getting doubled on each successive days.

On 24th day basket was filled completely.

$\therefore$ On 23rd day basket was filled = $\frac{1}{2}$

Hence, on 22nd day basket was filled = $\frac{1}{2}\left(\frac{1}{2}\right) = \frac{1}{4}$

70. (a) Let the two interest rates be R_1 and R_2

Now, $\frac{500 \times R_1 \times 2}{100} - \frac{500 \times R_2 \times 2}{100} = 2.50$

$\frac{500}{100} \times 2(R_1 - R_2) = 2.5$

$R_1 - R_2 = 0.25$

71. (d) Let total no. of questions be x.

Now, Right questions = 12 = 60% of x.

$0.6x = 12$

$x = 20$

72. (b) Given series is 200,250,300, ...n

Here, a = first term = 200

d = common difference = 50

n = 10

Since, given series is A.P

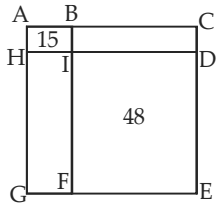
$\therefore$ Sum of A.P = $\frac{n}{2}\left[2a + (n-1)d\right]$

$= \frac{10}{2}\left[2 \times 200 + (9)(50)\right]$

$= 5 \times 850 = 4250$

Required penalty = sum of the series = ₹ 4250.

73. (b)



Area of ABIH = 15 $\Rightarrow$ AH = 3 and AB = 5

Now, area of EFID = 48 $\Rightarrow$ possibilities of length and breadth are (1,48), (2,24), (3,16), (4,12), (6,8)

Since, BC > AB $\Rightarrow$ BC > 5

Now, BC = ID $\Rightarrow$ BC = ID = 6.

Hence, length of square = 11

74. (d) Let the no. of ₹ 1 coins = x

and the no. of ₹ 2 coins = y

According to the question:

$x + y = 50$ ... (i)

$x.1 + 2.y = 75$ ... (ii)

on solving (i) and (ii), we get

$2y - y = 75 - 50$

$\Rightarrow y = 25$

put value of y in equation (i), we get

$x = 50 - y$

$= 50 - 25 = 25$

Hence, number of ₹ 1 and ₹ 2 coins are 25 and 25 respectively.

75. (a) Required minimum distance = L.C.M of 40,42 and 45.

2	40, 42, 45
2	20, 21, 45
2	10, 21, 45
5	5, 21, 45
3	1, 21, 9
3	1, 7, 3
7	1, 7, 1
	1, 1, 1

L.C.M = $2 \times 2 \times 2 \times 5 \times 3 \times 3 \times 7 = 2520$

Required distance = $2520 \div 100$

= 25 m 20 cm

76. (d) Average score for the first

4 tests $= \dfrac{3N + N + 20}{4}$

$= \dfrac{4N + 20}{4} = N + 5$

77. (d) Let the no. of total persons = 100

No. of male = 70% $= 100 \times \dfrac{70}{100} = 70$

$\therefore$ No. of female = 100 – 70 = 30

Total married person = 30 % $= \dfrac{30}{100} \times 100 = 30$

$\therefore$ Total unmarried person = 100–30 =70

Married male $= 70 \times \dfrac{2}{7} = 20$

$\therefore$ Married female = 30 – 20 = 10

Now, unmarried female = 30 – 10 = 20

$\therefore$ Required fraction = $\dfrac{20}{30} = \dfrac{2}{3}$

78. (a) Let gold coin be represented by 'G'.

Let non-gold coin be represented by 'N'.

Initial ratio = $\dfrac{G}{N} = \dfrac{1}{3}$ ...(i)

After adding 10 gold coins, the new ratio will be

$\dfrac{G + 10}{N} = \dfrac{1}{2}$ ...(ii)

Putting the value of $G = \dfrac{N}{3}$ in equation (2).

$\dfrac{\frac{N}{3} + 10}{N} = \dfrac{1}{2}$

On solving, we get $N = 60$

and $G = 30$

Presently, the total number of coins in the collection

= 10 + 20 + 60 = 90

79. (b) If the number of rows and columns are to be equal, then the total number of trees would represent a perfect square. Since, 1000 is not a perfect square, we need to check for a perfect square above and nearest to 1000. It's 1024, which is square of 32. So he needs 24 more trees to get 1024.

80. (b) Let the least value be x. Then the next value is x + 20 and the next value is x + 40 and so on.

According to question

$(x) + (x + 20) + (x + 40) + (x + 60) + (x + 80) + (x + 100) + (x + 120) = 700$

$\Rightarrow 7x + (20 + 40 + 60 + 80 + 100 + 120) = 700$

$\Rightarrow 7x + 20\,(1 + 2 + 3 + 4 + 5 + 6) = 700$

$\Rightarrow 7x + 20 \times 21 = 700$

$\Rightarrow 7(x + 60) = 7(100)$

$\Rightarrow x = 40$

81. (c) Out of 120, there are 70 males.

$\therefore$ 120 – 70 = 50 females

For a maximum, all 70 male shall have driver's license.

For a minimum, if all 50 females posses driver's license, then the remaining 30 licenses, shall be possessed by males.

So minimum male driver's licenses = 30.

Min. to max. = 30 to 70 = 3 to 7

82. (d) Let the remaining food last for x days.

1000 soldiers had provisions for (30 – 10) = 20 days

(1000 + 1000) men had provisions for x days.

More men, less days (indirect proportion)

$\therefore$ 2000 : 1000 :: 20 : x

$$\Rightarrow \frac{2000}{1000} = \frac{20}{x}$$

x = 10 days

83. (d) Let 'x' be the initial petrol consumption. Let 'y' be the number of days petrol lasts for. According to question

	Petrol consumption	Days
Initial	x	10
Final	$\frac{125}{100}x$	y

Hence, it's a case of indirect variation.

$$\therefore \quad x \times 10 = \frac{125}{100} x \times y$$

$$\Rightarrow \quad y = \frac{1000}{125} = 8 \text{ days}$$

84. (b) According to question

R = y and y = 2G

$\therefore$ R = 2G

Hence, the number of red balls is double the number of green balls.

85. (c) Total amount received is

$$= \frac{420}{2} \times 5 + \frac{420}{3} \times 3 + \frac{420}{6} \times 2$$

= 210 × 5 + 140 × 3 + 70 × 2

= 1050 + 420 + 140 = ₹ 1610

86. (c) Let C.P of 1st goat is ₹ 100.

$\therefore$ S.P. of 1st goat is ₹ 110 (10% profit)

$\therefore$ S.P. of 2nd goat is ₹ 110 (Same S.P.)

$$\therefore \text{ C.P. of 2nd goat} = \frac{100}{90} \times 110 \text{ (10\% loss)}$$

$$= \frac{1100}{9}$$

$$\therefore \text{ Total C.P.} = 100 + \frac{1100}{9} = \frac{2000}{9}$$

Total S.P. = 2 × 110 = 220

$$\therefore \text{ Loss \%} = \frac{\left(\frac{2000}{9} - 220\right) \times 100}{\frac{2000}{9}} = \frac{\frac{20}{9}}{\frac{2000}{9}} \times 100 = 1\% \text{ loss}$$

Shortcut method: Loss %

$$= \left(\frac{\text{common gain and loss\%}}{10}\right)^2 = \frac{100}{100} = 1\%$$

87. (b) Time gap after which they will first hit the target is given by LCM of 6, 7, 8, 9, 12.

2	6, 7, 8, 9, 12
3	3, 7, 4, 9, 6
2	1, 7, 4, 3, 2
	1, 7, 2, 3, 1

LCM = (12 × 42) sec.

$\therefore$ In 1 hr (= 3600 sec) no. of time they will hit together is

$$= \frac{3600}{12 \times 42} = \frac{50}{7} = 7\frac{1}{7} \text{ times}$$

= 7 times in an hour.

88. (b) LCM of 18, 24, 32

LCM of 9, 12, 16

LCM = 3 × 4 × 3 × 4

= 144 min

$$= \frac{144}{60} = 2\frac{2}{5} \text{hr}$$

= 2 hrs 24 min

$\therefore$ Bell will ring together again after 2 × (2 hrs 24 min)

= 4 hrs. 48 min

i.e., 12 : 48 hrs

89. (c) Let amount in each installment = x

Let total amount paid = L

According to Question.

$$\therefore \quad 18x = \frac{60}{100} \times L$$

$$\Rightarrow \frac{L}{x} = \frac{100 \times 18}{60} = 30 = \text{no. of installments.}$$

90. (b) Different sums of money can be formed by taking one, two, three and all the four notes together.

No. of different sums = ${}^4C_1 + {}^4C_2 + {}^4C_3 + {}^4C_4$

$= 4 + 6 + 4 + 1 = 15$

91. (b) Given, $n(U) = 100$

Number of students who play cricket = 60

i.e. $n(C) = 60$

Number of students who play football = 30

i.e. $n(F) = 30$

Number of students who play both the games = 10

i.e. $n(C \cap F) = 10$

To find : $n(C' \cap F') = ?$

we know,

$n(C \cup F) = n(C) + n(F) - n(C \cap F)$

$= 60 + 30 - 10 = 80$

$n(C' \cap F') = n(C \cup F)' = n(U) - n(C \cup F)$

$= 100 - 80 = 20$

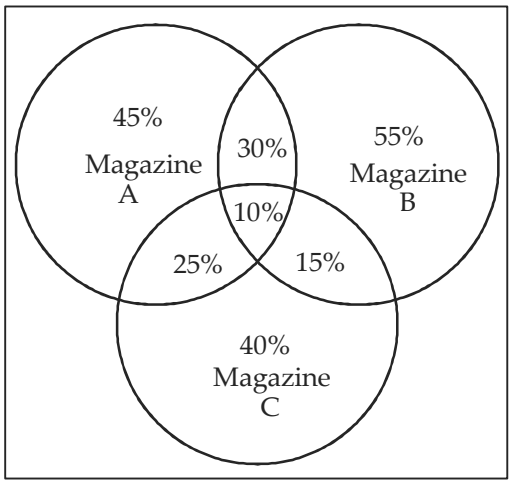
92. (c) According to question, A, B, C and D each carry ₹ 100.

$$A \xrightarrow{+20} B \xrightarrow{-10} C \xleftarrow{-30} D$$

80 120 140 70

Here, option (c) is not correct. C has more than what A and D have together.

93. (c)



Number of population who read the magazine

= (45 + 55 + 40) – (30 + 25 +15) + 10

= 140 – 70 + 10

= 80%

Number of population who do not read magazine

= 100 – 80 = 20%

94. (a) Let the capacity of each of the equal glass = x litre

Each glass containing x/3*l* and x/4*l* of milk.

The quantities of milk in first and the second glasses were $\frac{x}{3}$ and $\frac{x}{4}$ respectively

$$= \left(\frac{x}{3} + \frac{x}{4}\right)$$

$$= \frac{4x+3x}{12} = \frac{7x}{12} l$$

So, the quantities of water in the first and the second glasses were

$$= \left(x - \frac{x}{3}\right) l \text{ and } \left(x - \frac{x}{4}\right) l$$

$$= \frac{2x}{3} + \frac{3x}{4}$$

$$= \frac{8x+9x}{12} = \frac{17x}{12} l$$

Ratio of milk and water = $\frac{7x}{12} : \frac{17x}{12}$

$$= \frac{7}{17} \text{ or } 7 : 17$$

95. (b) Let each question carry x marks.

According to question

$$\Rightarrow 8x \times \frac{50}{100} = 40$$

$$x = \frac{40}{4} = 10$$

Numbers of question in the test = $\frac{100}{10} = 10$

96. (d) Let the son's age = x

Age of Father = 9x

Age of Mother = 8x

Now, According to question

$8x + 9x = 51$

$\Rightarrow \quad 17x = 51$

$x = 3$ years

97. (a) Let the Income of Peter and Paul are 4x and 3x
Let the Expenses of Peter and Paul are 3y and 2y
So, According to question
$4x - 3y = 6000$ ... (i)
$3x - 2y = 6000$ ... (ii)
Now, From equation (i) and equation (ii)
$4x - 3y = 3x - 2y$
$\therefore x = y \Rightarrow y = x$
Now, put the value of y in equation (i), we get
$\Rightarrow x = 6000$
$\therefore 4x = 24000$
$3x = 18000$
Monthly Incomes of Peter and Paul are ₹ 24000 and ₹ 18000 respectively.

Sol. 98 & 99.

E	A	C	B/D	F	D/B
22	21	20	19	18	17

98. (b) F is 18 years old.

99. (b) Two orders is possible in increasing age.

100. (d) Let 'g' be the cost of goats.
$4g < Cow < 5g$
Now, Given a goat price = ₹ 600
$2400 < Cow < 3000$ ... (i)
Given, a goat price = ₹ 800
$3200 < Cow < 4000$ ... (ii)
Hence, it can be seen that from above equations that cow cost is between ₹ 2400 and ₹ 4000.

101. (c) Let initial population be100

Men	Women
↓ 60%	↓ 40%
60	40
↓ 70%	↓ 75%
42	30
↓ 80%	↓ 70%
33	21

It is clear that more men cleared the examination than women.

■ ◆ ■