EXPLANATIONS

TYPE-I

1. (4) $\frac{7}{6} = 1.166$; $\frac{7}{9} = 0.777$

$\frac{4}{5} = 0.8$ and $\frac{5}{7} = 0.714$

Therefore, the smallest number is $\frac{5}{7}$

2. (1) $\frac{9}{13} = \frac{9 \times 4}{13 \times 4} = \frac{36}{52}$

$\frac{17}{26} = \frac{17 \times 2}{26 \times 2} = \frac{34}{52}$

$\frac{33}{52} = \frac{33}{52}$

Among these $\frac{33}{52}$ is the smallest

Again, $\frac{28}{29} = \frac{56}{58} > \frac{33}{52}$

3. (4) The smallest possible three-place decimal number = 0.001

4. (4) $\frac{8}{15}, \frac{14}{33}, \frac{7}{13}, \frac{11}{13}$

$\frac{8}{15} = 0.53\overline{3}$

$\frac{14}{33} = 0.\overline{42}$

$\frac{7}{13} = 0.538$

$\frac{11}{13} = 0.846$

$\therefore \frac{11}{13} > \frac{7}{13} > \frac{8}{15} > \frac{14}{33}$

5. (4) $\frac{8}{25} = 0.32$, $\frac{7}{23} = 0.30$

$\frac{11}{23} = 0.47$, $\frac{14}{53} = 0.26$

$\therefore \frac{14}{53}$ is the smallest fraction.

6. (4) The decimal equivalents of :

$\frac{6}{7} = 0.857$, $\frac{5}{6} = 0.833$,

$\frac{7}{8} = 0.875$, $\frac{4}{5} = 0.8$

Obviously, 0.875 is the greatest.

$\therefore \frac{7}{8}$ is the largest fraction.

7. (4) The smallest number of 5 digits = 10000

Now,

476)10000(21
952
480
476
4

$\therefore$ Required number = 10000 + (476 – 4)

= 10000 + 472 = 10472

8. (2) $\frac{15}{16} = 0.94$; $\frac{19}{20} = 0.95$

$\frac{24}{25} = 0.96$; $\frac{34}{35} = 0.97$

9. (1) $\frac{2}{3} = 0.67$; $\frac{5}{6} = 0.83$

$\frac{11}{15} = 0.73$; $\frac{7}{8} = 0.875$

10. (2) Decimal equivalents :

$\frac{4}{9} = 0.\dot{4}$; $\sqrt{\frac{9}{49}} = \frac{3}{7} = 0.43$

$0.\dot{4}\dot{5}$; $(0.8)^2 = 0.64$

$\therefore$ Least number = 0.43

$= \sqrt{\frac{9}{49}}$

11. (2) $0.9 = \frac{9}{10}$; $0.\overline{9} = \frac{9}{9} = 1$,

$0.0\overline{9} = \frac{9}{90} = \frac{1}{10}$;

$0.\overline{09} = \frac{9}{99} = \frac{1}{11}$

12. (2) $\frac{2}{7} = 0.286$; $\frac{1}{3} = 0.33$

$\frac{5}{6} = 0.833$; $\frac{3}{4} = 0.75$

13. (2) The smallest number of 5 digits = 10000

Remainder on dividing 10000 by 123 = 37

$\therefore$ Required number

= 10000 + (123 – 37) = 10086

14. (3) $(0.1)^2 = 0.01$

$\sqrt{0.0121} = \sqrt{0.11 \times 0.11} = 0.11$

$\sqrt{0.0004} = 0.02$

$\Rightarrow 0.01 < 0.02 < 0.11 < 0.12$

15. (4) LCM of 3, 2 and 6 = 6

$\therefore (3)^{\frac{1}{3}} = (3^2)^{\frac{1}{6}} = (9)^{\frac{1}{6}}$

$2^{\frac{1}{2}} = \left(2^3\right)^{\frac{1}{6}} = (8)^{\frac{1}{6}}$

$(1)^{\frac{1}{6}} = 1$; $(6)^{\frac{1}{6}} = (6)^{\frac{1}{6}}$

16. (4) 5 A 7
3 3 5
8 B 2

$\Rightarrow$ A $\rightarrow$ 1, 2, 3, 4, 5 &
B $\rightarrow$ 5, 6, 7, 8,9
8B2 is exactly divisible by 3.
$\therefore$ 8 + B + 2 = multiple of 3
$\therefore$ B = 5 or 8 $\Rightarrow$ A = 1 or 4

17. (4) If the number be x, then

$x - 31 = 75 - x$

$\Rightarrow 2x = 75 + 31 = 106$

$\Rightarrow x = 53$

18. (2) $0.7 + \sqrt{0.16}$

= 0.7 + 0.4 = 1.1

$1.02 - \frac{0.6}{24}$

= 1.02 – 0.025

= 0.995

$1.2 \times 0.83 = 0.996$

$\sqrt{1.44} = 1.2$

Hence, the greatest number

$= \sqrt{1.44}$

19. (1) $\frac{2}{3} = 0.66$

$\frac{3}{5} = 0.6$

$\frac{8}{11} = 0.73$

$\frac{11}{17} = 0.65$

20. (2) Let the three fractions be p, q and r, where $p < q < r$.

According to the question,

$$\frac{r}{p} = \frac{7}{6} \Rightarrow r = \frac{7}{6}p$$

Again, middle fraction

$$= q = \frac{7}{6} - \frac{1}{3} = \frac{7-2}{6} = \frac{5}{6}$$

$$\therefore p + q + r = 2\frac{11}{24}$$

$$\Rightarrow p + \frac{5}{6} + \frac{7}{6}p = \frac{59}{24}$$

$$\Rightarrow p + \frac{7p}{6} = \frac{59}{24} - \frac{5}{6}$$

$$\Rightarrow \frac{6p+7p}{6} = \frac{59-20}{24} = \frac{39}{24}$$

$$\Rightarrow 13p = \frac{39}{24} \times 6 = \frac{39}{4}$$

$$\Rightarrow p = \frac{39}{4 \times 13} = \frac{3}{4}$$

21. (1) Decimal equivalents of fractions :

$$\frac{4}{3} = 1.3$$

$$\frac{-2}{9} = -0.2$$

$$\frac{-7}{8} = -0.875$$

$$\frac{5}{12} = 0.42$$

$\therefore -0.875 < -0.2 < 0.42 < 1.3$

i.e., $\frac{-7}{8} < \frac{-2}{9} < \frac{5}{12} < \frac{4}{3}$

22. (2) On making denominators equal,

$$\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$$

$$\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$$

$$\frac{11}{15} = \frac{11}{15}$$

$$\therefore \frac{9}{15} < \frac{10}{15} < \frac{11}{15}$$

$$\Rightarrow \frac{3}{5} < \frac{2}{3} < \frac{11}{15}$$

TYPE-II

1. (2) Required remainder = remainder got when 63 is divided by 29 = 5

2. (4) $\frac{1}{0.04} = \frac{100}{4} = 25$

3. (4) The number (x y z x y z) can be written, after giving corresponding weightage of the places at which the digits occur, as

100000 x + 10000y + 1000z + 100x + 10y + z

= 100100x + 10010y + 1001z

= 1001 (100x + 10y + z)

Since 1001 is a factor, the number is divisible by 1001.

7 × 11 × 13 = 1001

As the number is divisible by 1001, it will also be divisible by all three namely, 7, 11 and 13 and not by only one of these because all three are factors of 1001.

So, the answer is 1001.

4. (1) 1000 = (45 × 22) + 10

$\therefore$ 45 – 10 = 35 to be added.

So, the smallest number to be added to 1000 to make the sum exactly divisible by 45 is 35.

5. (2) Number = $xy\ xy\ xy$

$= xy \times 10000 + xy \times 100 + xy$

$= xy\ (10000 + 100 + 1)$

$= xy \times 10101$

6. (2) Quotient = 16

Divisor = 25 × 16 = 400

and remainder = 80

Dividend = Divisor × quotient + Remainder

= 400 × 16 + 80

= 6400 + 80 = 6480

7. (2) Let the numbers be x and y.

$\therefore$ xy = 11520

and $\frac{x}{y} = \frac{9}{5}$

$$\therefore xy \times \frac{x}{y} = 11520 \times \frac{9}{5}$$

$\Rightarrow x^2 = 2304 \times 9$

$\Rightarrow x = \sqrt{2304 \times 9}$

$\Rightarrow 48 \times 3 = 144$

From $\frac{x}{y} = \frac{9}{5}$ we have

$$y = \frac{5 \times 144}{9} = 80$$

$\therefore$ Required difference

= 144 – 80 = 64

8. (2) **Rule :** When the second divisor is factor of first divisor, the second remainder is obtained by dividing the first remainder by the second divisor.

Hence, on dividing 29 by 8, the remainder is 5.

9. (2) Let the given number be x. Then,

$$\left(x \times \frac{3}{2}\right) - \left(x \div \frac{3}{2}\right) = 10$$

$$\Rightarrow \frac{3}{2}x - \frac{2}{3}x = 10$$

$$\Rightarrow \frac{9x - 4x}{6} = 10$$

$\Rightarrow 5x = 60 \Rightarrow x = 12$

10. (2) Here, 52 is a multiple of 13. Hence, the required remainder is obtained on dividing 45 by 13.

Required remainder = 6.

11. (4) $\frac{13}{4} \times \frac{2}{3} - \left(\frac{9}{4} - \frac{5}{3}\right) \times \frac{3}{4}$

$$= \frac{13}{6} - \left(\frac{27-20}{12}\right) \times \frac{3}{4}$$

$$= \frac{13}{6} - \frac{7}{12} \times \frac{3}{4} = \frac{13}{6} - \frac{7}{16}$$

$$= \frac{104-21}{48} = \frac{83}{48}$$

12. (1) Let number (dividend) be X.

$\therefore$ X = 296 × Q + 75 where Q is the quotient and can have the values 1, 2, 3 etc.

= 37 × 8 × Q + 37 × 2 + 1

= 37 (8Q + 2) + 1

Thus we see that the remainder is 1.

[Remark : When the second divisor is a factor of the first divisor, the second remainder is obtained by dividing the first remainder by the second divisor. Hence, divide 75 by 37, the remainder is 1**]**.

13. (3) The least number X in this case will be determined as follows:

4	X
5	Y – 1
	1 – 4

Y = 5 × 1 + 4 = 9

X = 4 × Y + 1 = 4 × 9 + 1 = 37
Now,

5	37		
4	7	–	2
	1	–	3

Hence, the respective remainders are 2, 3.

14. (2) Remainder = 4
$\Rightarrow$ Divisor = 3 × 4 = 12
Again, divisor = 4 × quotient
$\Rightarrow$ 4 × quotient = 12

$$\Rightarrow \text{Quotient} = \frac{12}{4} = 3$$

$\Rightarrow$ Dividend = 3 × 12 + 4 = 40

15. (4) Let the required number of persons be x.
According to the question,
$2x^2 = 3042$

$$\text{or } x^2 = \frac{3042}{2} = 1521$$

$$\text{or } x = \sqrt{1521} = 39$$

16. (2) Number just greater than 3 which is divisible by 7 = 7
Number just smaller than 200 which is divisible by 7 = 196
Here, $a = 7$, $a_n = 196$,
$d = 7$, $n = 8$
$\therefore a_n = a + (n-1)d$
$\Rightarrow 196 = 7 + (n-1) \times 7$

$$\Rightarrow n - 1 = \frac{196 - 7}{7} = 27$$

$\Rightarrow n = 27 + 1 = 28$
Note : We can find the answer after dividing 200 by 7. The quotient is our answer.

17. (4) Sum of first 60 numbers

$$= \frac{60(60+1)}{2} = \frac{60 \times 61}{2} = 1830$$

The number 1830 is divisible by 61.

18. (2) The least number (dividend) x is obtained as follows :

3	x
2	$y-1$
	$1-1$

$y = 2 \times 1 + 1 = 3$
$x = 3 \times 3 + 1 = 10$
When we divide 10 by 6, the remainder = 4

19. (3) Let the numbers be x and y and x is greater than y.
As given,
$xy = 9375$ ....(i)
Again,

$$\frac{x}{y} = 15$$

$\Rightarrow x = 15y$
$\therefore$ From equation (i),
$15y \times y = 9375$

$$\Rightarrow y^2 = \frac{9375}{15} = 625$$

$$\Rightarrow y = \sqrt{625} = 25$$

$\therefore x = 15y = 15 \times 25 = 375$
$\therefore x + y = 375 + 25 = 400$

20. (4) On dividing the given number by 119, let k be the quotient and 19 as remainder.
Then, number = $119k + 19$
$= 17 \times 7k + 17 \times 1 + 2$
$= 17(7k + 1) + 2$
Hence, the given number when divided by 17, gives $(7k + 1)$ as quotient and 2 as remainder.

21. (2) By the Binomial expansion we have
$(x+1)^n = x^n + {}^nc_1 x^{n-1} + {}^nc_2 x^{n-2} + \ldots\ldots + {}^nc_{n-1} x + 1$
Here, each term except the last term contains x. Obviously, each term except the last term is exactly divisible by x.
Following the same logic,
$7^{19} = (6+1)^{19}$ has each term except last term divisible by 6.
Hence, $7^{19} + 2$ when divided by 6 leaves remainder
$= 1 + 2 = 3$

22. (3) Here, 357 is exactly divisible by 17.
$\therefore$ Required remainder = Remainder obtained on dividing 39 by 17 = 5

23. (2) Number = 269 × 68
$= 269 \times (67 + 1)$
$= 269 \times 67 + 269$
Clearly, remainder is obtained on dividing 269 by 67 that is 1.

24. (4) The remainder will be same.
On dividing 9 by 6, remainder = 3
On dividing 81 by 6, remainder = 3

25. (2) Here, 893 is exactly divisible by 47.
Hence, the required remainder is obtained on dividing 193 by 47.
$\therefore$ Remainder = 5

26. (4) Let the least number be x.

13	x	Remainder
5	y	1
	1	3

$y = 5 \times 1 + 3 = 8$
$x = 13 \times 8 + 1 = 105$
On dividing 105 by 65, remainder = 40

27. (4) A number will be exactly divisible by 18 if it is divisible by 2 and 9 both. Clearly 65043 is not divisible by 2.
$\therefore$ Required number = 65043

28. (3) $\times\times\times)\,6\,4\,3\,2\,9\,(\times\times\times$
$\times\times\times$.....(i)
$\overline{1\,7\,5\,2}$
$\times\times\times\times$.....(ii)
$\overline{\times 1\,1\,4\,9}$
$\times\times\times\times$.....(iii)
$\overline{\times\,2\,1\,3}$

Number at (i) = 643 – 175 = 468
Number at (ii) = 1752 – 114
= 1638
Number at (iii) = 1149 – 213
= 936
Clearly, 468, 1638 and 936 are multiples of 234 and 234 > 213.
$\therefore$ Divisor = 234

29. (4) Let the quotient be Q and the remainder be R. Then
Divisor = 7 Q = 3 R

$$\therefore Q = \frac{3}{7}R = \frac{3}{7} \times 28 = 12$$

$\therefore$ Divisor = 7 Q = 7 × 12 = 84
$\therefore$ Dividend = Divisor × Quotient + Remainder = 84 × 12 + 28 = 1008 + 28 = 1036

30. (3) Required divisor
= 3 + 4 – 2 = 5

31. (1) Let the number be $10x + y$
After interchanging the digits, the number obtained = $10y + x$
According to the question,
Resulting number
$= 10x + y + 10y + x$
$= 11x + 11y$
$= 11(x + y)$ which is exactly divisible by 11.

32. (4) If the quotient in the first case be x.
Then, number = $5x + 3$
On Squaring, the number
= $(5x + 3)^2$
= $25x^2 + 30x + 9$
On dividing by 5, remainder
= 9 – 5 = 4

33. (3) Here, the first divisor 192 is a multiple of second divisor 16.
∴ Required remainder
= remainder obtained by dividing 54 by 16 = 6

34. (4) If the first divisor be a multiple of the second divisor, then required remainder = remainder obtained by dividing the first remainder (36) by the second divisor (17) = 2

35. (3) First number (X) = $17x + 13$
Second number (Y) = $17y + 11$

$$\therefore \frac{X+Y}{17} = \frac{17(x+y)}{17} + \frac{13+11}{17}$$

∴ Required remainder
= Remainder obtained on dividing
11 + 13 i.e. 24 by 17 = 7

36. (4) Here, the first divisor (221) is a multiple of second divisor (13) Hence, required remainder
= remainder obtained on dividing 64 by 13 = 12

37. (4) Required remainder = Remainder obtained by dividing 2^2 by 5.
Remainder = 4

38. (3) $3^1 = 3$; $3^2 = 9$; $3^3 = 27$; $3^4 = 81$; $3^5 = 243$
i.e. unit's digit is repeated after index 4.
Remainder after dividing 21 by 4 = 1
∴ Unit's digit in the expansion of $(3)^{21} = 3$
∴ Remainder after dividing by 5 = 3

39. (1) Here, the first divisor i.e. 49 is multiple of second divisor i.e. 7.
∴ Required remainder = Remainder obtained on dividing 32 by 7 = 4

40. (1) Here, the first divisor (36) is exactly divisible by the second divisor (12).
∴ Required remainder
= Remainder obtained after 19 is divided by 12 = 7

41. (*) If $(x \pm 1)^n$ is divided by x, the remainder is $(\pm 1)^n$,
Now, $9^6 - 11 == (8 + 1)^6 - 11$
When it is divided by 8,
remainder = + 1 – 11 = – 10
When – 10 is divided by 8, remainder = – 2 i.e. – 2 + 8 = 6

42. (3) $(17)^{200} = (18 - 1)^{200}$
We know that
$(x + a)^n$
$= x^n + nx^{n-1}.a +$

$$+\frac{n(n-1)}{1\times 2}x^{n-2}a^2$$

$$+\frac{n(n-1)(n-2)}{1\times 2\times 3}x^{n-3}a^3 + \ldots\ldots + a^n$$

We see that all the terms on the R.H.S. except a^n has x as one of its factor and hence are divisible by x. So, $(x + a)^n$ is divisible by x or not will be decided by a^n.
Let x = 18, a = – 1
and n = 200
∴ $(18 - 1)^{200}$ is divisible by 18 or not will depend on $(-1)^{200}$ as all other terms in its expansion will be divisible by 18 because each of them will have 18 as one of their factors.
$(-1)^{200} = 1$ (∵ 200 is even)
1 is not divisible by 18 and is also less than 18.
∴ 1 is the remainder.

43. (2) $2^{31} = \left(2^8\right)^4 \div 2 = (256)^4 \div 2$

$$= \frac{\ldots\ldots 6}{2} = \ldots\ldots 3$$

Clearly, the remainder will be 3 when divided by 5.
Illustration :
23 ÷ 5 gives remainder = 3
83 ÷ 5 gives remainder = 3

44. (2) Let the number be x.

$$\therefore \frac{x+12}{6} = 112$$

$\Rightarrow x + 12 = 672$
$\Rightarrow x = 672 - 12 = 660$

$$\therefore \text{Correct answer} = \frac{660}{6} + 12$$

= 110 + 12 = 122

45. (3) Here, 387 is a multiple of 43.
∴ Remainder obtained on dividing 48 by 43 i.e. 5 is the required remainder.

46. (4) If two numbers are separately divided by a certain divisor (d) leaving remainders r_1 and r_2, then remainder after their sum is divided by the same divisor.
$= r_1 + r_2 - d$
= 21 + 28 – 33 = 16

47. (4) Divisor = 5 × Remainder
= 5 × 46 = 230

$$\text{Quotient} = \frac{230}{10} = 23$$

∴ Dividend = Divisor × Quotient + Remainder
= 230 × 23 + 46
= 5290 + 46 = 5336

48. (2) Required remainder
= 16 – 12 = 4
(because 24 is a multiple of 12.)

49. (4) $2^{6n} - 4^{2n} = \left(2^6\right)^n - \left(4^2\right)^n$
$= 64^n - 16^n$
which is divisible by 64 – 16 = 48

50. (1) $4^{61} + 4^{62} + 4^{63}$
$= 4^{61}(1 + 4 + 4^2)$
$= 4^{61} \times 21$ which is divisible by 3.

51. (4) Let the unknown number be x.
∴ $71 \times x + 47 = 98 \times 7$
$\Rightarrow 71x = 686 - 47 = 639$

$$\Rightarrow x = \frac{639}{71} = 9 = 3 \times 3$$

52. (3) Of the given alternatives,
When 64 is divided by 3, remainder = 1
When 65 is divided by 5, remainder = 0

53. (2) Here, the first divisor (91) is a multiple of second divisor (13).
∴ Required remainder = Remainder obtained on dividing 17 by 13 = 4

54. (3) $x + y = 120$ ..... (i)

$$\frac{x}{y} = 5$$

$\Rightarrow x = 5y$
From, equation (i),
$5y + y = 120$
$\Rightarrow 6y = 120 \Rightarrow y = 20$
∴ $x = 120 - 20 = 100$
∴ Difference = 100 – 20 = 80

55. (2) Here, 280 is a multiple of 35.
∴ Required remainder
= Remainder obtained on dividing 115 by 35 = 10

56. (2) Here, first divisor (175) is a multiple of second divisor (25).
$\therefore$ Required remainder = Remainder obtained on dividing 132 by 25 = 7

57. (3) We have to find such numbers which are divisible by 12 (LCM of 4 and 6).
Number of numbers divisible by 12 and lying between 1 to 600
$= \frac{600}{12} - 1 = 49$
Number of numbers divisible by 12 from 1 to 100 $= \frac{100}{12} = 8$
$\therefore$ Required answer
$= 49 - 8 = 41$

58. (2) $(x-2)$ is a factor of polynomial $P(x) = x^3 + x^2 - 5x + \lambda$.
$\therefore P(2) = 0$ (i.e., on putting $x = 2$)
$\Rightarrow 2^3 + 2^2 - 5 \times 2 + \lambda = 0$
$\Rightarrow 8 + 4 - 10 + \lambda = 0$
$\Rightarrow \lambda + 2 = 0$
$\Rightarrow \lambda = -2$

59. (3) Required Number
$= 100x + 10y + z$
$\because 10y + z = 6m$
$\therefore$ Number $= 100x + 6m$, where m is a positive integer.
$= 2(50x + 3m)$

60. (4) If the first part be x, then second part $= 37 - x$.
$\therefore x \times 5 + (37 - x)\,11 = 227$
$\Rightarrow 5x + 407 - 11x = 227$
$\Rightarrow 6x = 407 - 227 = 180$
$\Rightarrow x = 30$
$\therefore$ Second part = 7

61. (1) $3^1 = 3$, $3^2 = 9$,
$3^3 = 27$, $3^4 = 81$
i.e. the unit's digit = odd number
$\therefore$ Hence, both numbers are divisible by 2.

62. (1) LCM of 4, 5 and 6 = 60
Quotient on dividing 800 by 60 = 13
Quotient on dividing 400 by 60 = 6
$\therefore$ Required answer = 13 – 6 = 7
Method 2 :
First number greater than 400 that is divisible by 60 = 420
Smaller number than 800 that is divisible by 60 = 780
It is an Arithmetic Progression with common difference = 60
By $t_n = a + (n-1)d$
$780 = 420 + (n-1) \times 60$
$\Rightarrow (n-1) \times 60 = 780 - 420$
$= 360$
$\Rightarrow (n-1) = 360 \div 60 = 6$
$\Rightarrow n = 6 + 1 = 7$

63. (1) The no. is of the form $(425x + 45)$ First divisor (425) is multiple of second divisor (17).
$\therefore$ Required remainder
= Remainder obtained on dividing 45 by 17 = 11

64. (4) Here, the first divisor (289) is a multiple of second divisor (17).
$\therefore$ Required remainder = Remainder obtained on dividing 18 by 17 = 1

65. (1) $n = 6q + 4$
$2n = 12q + 8$
Dividing 8 by 6 the remainder = 2

66. (4) If the remainder be x, then $(11284 - x)$ and $(7655 - x)$ are divisible by three digit number.
i.e. $(11284 - x) - (7655 - x)$
$= 3629$ is divisible by that number.
$3629 = 19 \times 191$
Hence, required number = 191
Sum of digits = 1 + 9 + 1 = 11

67. (1) Divisor $= 6 \times 2 = 12$
Again, Divisor = 3 × quotient
$\therefore$ Quotient $= \frac{12}{3} = 4$
Dividend $= 12 \times 4 + 2$
$= 48 + 2 = 50$

68. (3) $2^{16} - 1 = (2^8)^2 - 1$
$= (2^8+1)(2^8-1)$
$= (256 + 1)(256 - 1)$
$= 257 \times 255$ which is exactly divisible by 17.

69. (3)
$$\begin{array}{r} 11)803642(73058 \\ \underline{77} \\ 33 \\ \underline{33} \\ \times 64 \\ \underline{55} \\ 92 \\ \underline{88} \\ 4 \end{array}$$
$\therefore$ The required number
$= 11 - 4 = 7$

Method 2 :
Sum of digits at odd places = 2 + 6 + 0 = 8, sum of digits at even places = 4 + 3 + 8 = 15. For divisibility by 11, difference i.e., (15 – 8) = 0 or mutiple of 11.
$\therefore$ The required number = 7

70. (3) $5^{71} + 5^{72} + 5^{73}$
$= 5^{71}(1 + 5 + 5^2)$
$= 5^{71} \times 31$ which is exactly divisible by 155.

71. (2) $[n] < n$ (integer); $(n) > n$ (integer)
$\therefore$ Expression
$= 2 \times 1 - 2 \div 1 + 2 = 2$

72. (2) Required number
$= 1.1 - 0.01 = 1.09$

73. (1) $999\ \frac{998}{999} \times 999$
$= \left(999 + \frac{998}{999}\right) \times 999$
$= 999^2 + 998$
$= (1000 - 1)^2 + 998$
$= 1000000 - 2000 + 1 + 998$
$= 998999$

74. (2) Expression
$= 2^{71}(1 + 2 + 4 + 8)$
$= 2^{71} \times 15 = 2^{71} \times 3 \times 5$
Which is exactly divisible by 10.

75. (1) Let required number be x.
$\therefore 0.022 \times x = 66$
$\Rightarrow x = \frac{66}{0.022} = 3000$

76. (4) $3^{25} + 3^{26} + 3^{27} + 3^{28}$
$= 3^{25}(1 + 3 + 3^2 + 3^3)$
$= 3^{25}(1 + 3 + 9 + 27)$
$= 3^{25} \times 40$, which is clearly divisible by 30.

77. (2) $\therefore$ Required sum
$= 0.34\overline{67} + 0.13\overline{33} = 0.48\overline{01}$

Illustration =
$$\begin{array}{r|c|c} 0.34 & 67 & 67 \\ \underline{0.13} & \underline{33} & \underline{33} \\ 0.48 & 01 & 00 \end{array}$$

78. (3) **Tricky Approach**
Taking approximate values, we have
$\frac{3 \times 4126 \times 3}{64 \times 2835} = 0.2046 \approx 0.2$

79. (2) Expression
$= \frac{1}{7} + \left(999 + \frac{692}{693}\right) \times 99$
$= \frac{1}{7} + 999 \times 99 + \frac{692}{693} \times 99$

$= \frac{1}{7} + (1000 - 1)\ 99 + \frac{692}{7}$

$= \frac{1}{7} + \frac{692}{7} + 99000 - 99$

$= \frac{693}{7} + 99000 - 99$

$= 99 + 99000 - 99 = 99000$

80. (4) $x^n - a^n$ is exactly divisible by $(x-a)$ if n is odd.
$\therefore (49)^{15} - (1)^{15}$ is exactly divisible by 49–1 = 48, that is a multiple of 8.

81. (3) $a^4 - b^4 = (a^2)^2 - (b^2)^2 = (a^2 + b^2)(a^2 - b^2) = (a^2 + b^2)(a + b)(a - b)$
Let $a = 3$, $b = 1$
$\therefore$ Required number
$= (3 + 1)(3 - 1) = 8$

82. (1) Let $m = n = p$ and $m - n = 2p$
$m + n = 2p$
$\therefore\ (m - n)(m + n) = 4p^2$
$\Rightarrow\ m^2 - n^2 = 4p^2$

83. (3) A number is divisible by 9, if sum of its digits is divisible by 9. Let the number be x.
$\Rightarrow 5 + 4 + 3 + 2 + x + 7$
$= 21 + x$
$\therefore\ x = 6$

84. (1) A number is divisible by 9 if the sum of its digits is divisible by 9.
Here, 6 + 7 + 0 + 9 = 22
Now, 22 + 5 = 27, which is divisible by 9. Hence 5 must be added to 6709.

85. (2) A number is divisible by 9 and 6 both, if it is divisible by LCM of 9 and 6 i.e., 18. Hence, the numbers are 108, 126, 144, 162, 180, 198.

86. (2) First 3–digit number divisible by 6 = 102
Last such 3-digit number =996
$\therefore 996 = 102 + (n - 1)\ 6$
$\Rightarrow\ (n - 1)6 = 996 - 102 = 894$

$\Rightarrow\ n - 1 = \frac{894}{6} = 149$

$\Rightarrow\ n = 150$

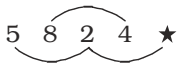
87. (2) $n^3 - n = n(n^2 - 1)$
$= n(n + 1)(n - 1)$
For $n = 2$, $n^3 - n = 6$

88. (3) $n^3 - n = n(n + 1)(n - 1)$
$n = 1$, $n^3 - n = 0$
$n = 2$, $n^3 - n = 2 \times 3 = 6$
$n = 3$, $n^3 - n = 3 \times 4 \times 2 = 24$
$n = 4$, $n^3 - n = 4 \times 5 \times 3 = 60$
$60 \div 6 = 10$

89. (3) Number $= 100x + 10y + z$
Sum of digits $= x + y + z$
Difference $= 100x + 10y + z - x - y - z$
$= 99x + 9y = 9(11x + y)$

90. (3) divisible by (11×13)

91. (3) Any number is divisible by 11 when the differences of alternative digits is 0 or multiple of 0, 11 etc. Here,



$5 + 2 + \star = 7 + \star$
$8 + 4 = 12$
$\therefore\ \star = 12 - 7 = 5$

92. (4) A number is divisible by 11, if the difference of the sum of its digits at odd places and the sum of its digits of even places, is either 0 or a number divisible by 11.
$\therefore (5 + 9 + * + 7) - (4 + 3 + 8) = 0$ or multiple of 11
$\Rightarrow 21 + * - 15$
$\therefore * + 6 =$ a multiple of 11
$\therefore * = 5$

93. (4) A number is divisible by 11, if the difference of sum of its digits at odd places and the sum of its digits at even places is either 0 or a number divisible by 11.
Difference
$= (4 + 3 + 7 + 8) - (2 + 8 + \star)$
$= 22 - 10 - \star$
$= 12 - \star$
Clearly, $\star = 1$

94. (4) A number is divisible by 11 if the difference of the sum of digits at odd and even places be either zero or multiple of 11.
If the middle digit be 4, then 24442 or 244442 etc are divisible by 11.

95. (2) $n^2(n^2 - 1) = n^2(n + 1)(n - 1)$
Now, we put values $n = 2, 3.....$
When $n = 2$
$\therefore n^2(n^2 - 1) = 4 \times 3 \times 1 = 12$, which is a multiple of 12
When n = 3.
$n^2(n^2 - 1) = 9 \times 4 \times 2 = 72$,
which is also a multiple of 12. etc.

96. (4) Let the unit digit be x and ten's digit be y.
$\therefore$ Number
$= 1000y + 100x + 10y + x$
$= 1010y + 101x = 101(10y + x)$
Clearly, this number is divisible by 101, which is the smallest three-digit prime number.

97. (2) The least number of 5 digits = 10000

```
41)10000(243
   82
  ---
  180
  164
  ---
   160
   123
   ---
    37
```

$\therefore$ Required number
$= 10000 + (41 - 37)$
$= 10004$

98. (1) $2^{96} + 1 = (2^{32})^3 + 1^3$
$= (2^{32} + 1)(2^{64} - 2^{32} + 1)$
Clearly, $2^{32} + 1$ is a factor of $2^{96} + 1$

99. (4) For $n = 1$
$n^4 + 6n^3 + 11n^2 + 6n + 24$
$= 1 + 6 + 11 + 6 + 24 = 48$
For $n = 2$
$n^4 + 6n^3 + 11n^2 + 6n + 24$
$= 16 + 48 + 44 + 12 + 24$
$= 144$ which is divisible by 48.
Clearly, 48 is the required number.

100. (2) When we divide 1000 by 225, quotient = 4
When we divide 5000 by 225, quotient = 22
$\therefore$ Required answer = 22 – 4 = 18

101. (3) $(n^3 - n)(n - 2)$
$= n(n - 1)(n + 1)(n - 2)$
When $n = 3$,
Number $= 3 \times 2 \times 4 = 24$

102. (1) LCM of 16 and 18 = 144
Multiple of 144 that is less than 1500 = 1440

103. (2) The largest 4-digit number = 9999

```
345)9999(28
    690
   ----
    3099
    2760
    ----
     339
```

$\therefore$ Required number = 345 – 339 = 6

104. (2) $4^{61} + 4^{62} + 4^{63} + 4^{64}$
$= 4^{61}(1 + 4 + 4^2 + 4^3)$
$= 4^{61}(1 + 4 + 16 + 64)$
$= 4^{61} \times 85$
Which is a multiple of 10.

105. (2) Let the number be $10x + y$

where $y < x$.

Number obtained by interchanging the digits = $10y + x$

$\therefore$ Difference = $10x + y - 10y - x$

$= 9x - 9y = 9(x - y)$

Hence, the difference is always exactly divisible by 9.

106. (3) Check through option

$$\frac{303375}{25} = \frac{303375 \times 4}{25 \times 4}$$

$$= \frac{1213500}{100} = 12135$$

A number is divisible by 25 if the last two digits are divisible by 25 or zero.

107. (1) $307 \times 32 = 9824$

$307 \times 33 = 10131$

$\therefore$ Required number

$= 10131 - 9999 = 132$

108. (1) $a = 4011$, $b = 3989$

$\therefore ab = 4011 \times 3989$

$= (4000 + 11)(4000 - 11)$

$= (4000)^2 - (11)^2$

$= 16000000 - 121$

$= 15999879$

109. (2) Expression $= 3^{2n} + 9n + 5$

$= (3^{2n} + 9n + 3) + 2$

$= 3(3^{2n-1} + 3n + 1) + 2$

Clearly, remainder = 2

110. (1) $12x - 61 \le 6 \Rightarrow 12x \le 61 + 6$

$$\Rightarrow 12x < 67 \Rightarrow x \le \frac{67}{12}$$

$\Rightarrow x < 6$ (Approx.)

111. (3) Resulting number = 3957 + 5349 – 7062 = 2244 which is divisible by 4, 3 and 11.

$2244 \div 4 = 561$

$2244 \div 3 = 748$

$2244 \div 11 = 204$

112. (3) Prime numbers between 80 and 90.

= 83 and 89

$\therefore$ Required product = 83×89

= 7387

113. (2) When $n = 2$,

$6^n - 1 = 6^2 - 1 = 36 - 1 = 35$

When, n = an even number,

$a^n - b^n$ is always divisible by $(a^2 - b^2)$.

114. (2) Total number of marbles = $x + x + 3 + x - 3 = 3x$

$\therefore 3x = 15 \Rightarrow x = 5$

115. (3)

Bucket + full water = 17 kg.

Bucket + $\frac{1}{2}$ water = 13.5 kg.

– – –

$$\frac{1}{2} \text{ water} = 3.5 \text{ kg.}$$

$\therefore$ Water = $2 \times 3.5 = 7$ kg.

$\therefore$ Weight of empty bucket

$= 17 - 7 = 10$ kg.

116. (4) A cow and a hen each has a head.

If the total number of cows be x, then

Number of hens = $180 - x$

A cow has four legs and a hen has two legs.

$\therefore (180 - x) \times 2 + 4x = 420$

$\Rightarrow 360 - 2x + 4x = 420$

$\Rightarrow 2x = 420 - 360 = 60$

$$\Rightarrow x = \frac{60}{2} = 30$$

117. (4) On putting $n = 1$

$n(n+1)(n+2) = 1 \times 2 \times 3 = 6$

118. (2) $2736 \div 24 = 114$

Hence, first divisor (2736) is a multiple of second divisor (24).

$\therefore$ Required remainder

= Remainder obtained on dividing 75 by 24 = 3

119. (2) 5 E9 + 2 F8 + 3 G7 = 1114

Value of 'F' will be maximum if the values of E and G are minimum.

$\therefore$ 509 + 2 F8 + 307 = 1114

$\Rightarrow$ 2 F8 = 1114 – 509 – 307 = 298

$\Rightarrow$ F = 9

120. (4) Let four numbers be a, b, c and d respectively.

$\therefore a + b + c + d = 48$ .....(i)

and,

$a + 5 = b + 1 = c - 3 = d - 7 = x$ (let)

$\therefore a = x - 5$; $b = x - 1$,

$c = x + 3$, $d = x + 7$

From equation (i),

$x - 5 + x - 1 + x + 3 + x + 7 = 48$

$\Rightarrow 4x + 4 = 48$

$\Rightarrow 4x = 48 - 4 = 44$

$$\Rightarrow x = \frac{44}{4} = 11$$

$\therefore a = x - 5 = 11 - 5 = 6$

$b = x - 1 = 11 - 1 = 10$

$c = x + 3 = 11 + 3 = 14$

$d = x + 7 = 11 + 7 = 18$

121. (2) 27) 2055 (76

189

165

162

3

$\therefore$ Required number = 27 – 3 = 24

122. (2) Sum of first n natural numbers

$$= \frac{n(n+1)}{2}$$

$\therefore$ Required average

$$= \frac{n(n+1)}{2 \times n} = \frac{n+1}{2}$$

123. (3) Here, the first divisor (361) is a multiple of second divisor (19).

$\therefore$ Required remainder = Remainder obtained on dividing 47 by 19 = 9

124. (3) Largest number = 3995

Smallest number = 3005

Difference = 3995 – 3005 = 990

125. (2) Let the numbers be x and y.

According to the question,

$x + y = 75$

$x - y = 25$

$\because (x+y)^2 - (x-y)^2 = 4xy$

$\Rightarrow 75^2 - 25^2 = 4xy$

$\Rightarrow 4xy = (75 + 25)(75 - 25)$

$\left[\because a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow 4xy = 100 \times 50$

$$\Rightarrow xy = \frac{100 \times 50}{4} = 1250$$

126. (4) Required difference

$= 97 - 2 = 95$

127. (4) $xy = 24$

$\therefore (x, y)$

$= (1 \times 24), (2 \times 12), (3 \times 8), (4 \times 6)$

$\therefore$ Minimum value of $(x + y)$

$= 4 + 6 = 10$.

128. (3) Let the 3–digit number be $100x + 10y + z$.

Sum of the digits = $x + y + z$

According to the question,

Difference

$= 100x + 10y + z - (x + y + z)$

$= 99x + 9y$

$= 9(11x + y)$

Clearly, it is a multiple of 3 and 9.

129. (1) Let the numbers be x and y where $x > y$.

According to the question,

$(x + y) - (x - y) = 30$

$\Rightarrow x + y - x + y = 30$

$\Rightarrow 2y = 30$

$\Rightarrow y = \frac{30}{2} = 15$

$\therefore xy = 900$

$\Rightarrow 15x = 900$

$\Rightarrow x = \frac{900}{15} = 60$

130. (3) According to the question,
Divisor (d) = 5r = 5 × 46 = 230
Again, Divisor (d) = 10 × Quotient (q)
$\Rightarrow 230 = q \times 10$

$\Rightarrow q = \frac{230}{10} = 23$

$\therefore$ Dividend = Divisor × Quotient + Remainder
= 230 × 23 + 46
= 5290 + 46 = 5336

131. (3) Divided = 44 × 432 = 19008

```
31) 19008 (613
    186
    ---
     40
     31
    ---
     98
     93
    ---
      5
```

$\therefore$ Remainder = 5

132. (2) Here, first divisor (729) is a multiple of second divisor (27).
$\therefore$ Required remainder = Remainder got on dividing 56 by 27 = 2.

133. (4) Smallest number of six digits
= 100000

```
108) 100000 (925
     972
     ---
     280
     216
     ---
      640
      540
      ---
      100
```

$\therefore$ Required number
= 100000 + (108 – 100)
= 100008

134. (2) Let the number be x.
According to the question,

$x + 25 = 3x - 3$

$\Rightarrow 3x - x = 25 + 3$

$\Rightarrow 2x = 28 \Rightarrow x = 14$

135. (1) $334 \times 545 \times 7p$ is divisible by 3340.

$\Rightarrow 334 \times 5 \times 109 \times 7 \times p$, is divisible by $334 \times 2 \times 5$

Clearly, $p = 2$

136. (2) Let the number be a.
According to the question,

$a + \frac{1}{a} = 2$

$\Rightarrow a^2 + 1 = 2a \Rightarrow a^2 - 2a + 1 = 0$

$\Rightarrow (a - 1)^2 = 0 \Rightarrow a - 1 = 0$

$\Rightarrow a = 1$

137. (3) $\because$ First divisor (56) is a multiple of second divisor (8).
$\therefore$ Required remainder
= Remainder obtained after dividing 29 by 8 = 5

138. (2) Let the number be x.
According to the question,

$x - 4 = \frac{21}{x}$

$\Rightarrow x^2 - 4x = 21$

$\Rightarrow x^2 - 4x - 21 = 0$

$\Rightarrow x^2 - 7x + 3x - 21 = 0$

$\Rightarrow x(x - 7) + 3(x - 7) = 0$

$\Rightarrow (x + 3)(x - 7) = 0$

$\Rightarrow x = 7$ because $x \neq -3$.

139. (2) Let quotient be 1.
$\therefore n = 4 \times 1 + 3 = 7$
$\therefore 2n = 2 \times 7 = 14$,
On dividing 14 by 4, remainder = 2

140. (1) Divisor = 555 + 445 = 1000
Quotient = (555 – 445) × 2
= 110 × 2 = 220
Remainder = 30
$\therefore$ Dividend = Divisor × Quotient + Remainder
= 1000 × 220 + 30 = 220030

141. (1) According to the question,
Divisor = 2 × remainder
= 2 × 80 = 160
Again, 4 × quotient = 160

$\Rightarrow$ Quotient = $\frac{160}{4} = 40$

$\therefore x$ = Divisor × Quotient + remainder
= 160 × 40 + 80 = 6480

142. (2) Here, first divisor (342) is a multiple of second divisor (18).
i.e. 342 ÷ 18 = 19
$\therefore$ Required remainder
= Remainder on dividing 47 by 18 = 11

143. (3) Let second number = x.
$\therefore$ First number = $3x$

Third number = $\frac{2}{3} \times 3x$

$= 2x$
According to the question,
$3x + x + 2x = 252$
$\Rightarrow 6x = 252$

$\Rightarrow x = \frac{252}{6} = 42$

144. (3) Five-digit numbers formed by 2, 5, 0, 6 and 8 :
Largest number = 86520
Smallest number = 20568
Required difference
= 86520 – 20568 = 65952

145. (1) Let the number of cows be x.
$\because$ A hen or a cow has only one head.
$\therefore$ Number of hens = $50 - x$
A hen has two feet.
A cow has four feet.
According to the question,
$4x + 2(50 - x) = 142$
$\Rightarrow 4x + 100 - 2x = 142$
$\Rightarrow 2x = 142 - 100 = 42$

$\Rightarrow x = \frac{42}{2} = 21$

146. (2) Firstly, we find LCM of 5, 6, 7 and 8.

2	5, 6, 7, 8
	5, 3, 7, 4

$\Rightarrow$ LCM = 2 × 5 × 4 × 3 × 7= 840
Required number
= $840x + 3$ which is exactly divisible by 9.
Now, $840x + 3$
= $93x \times 9 + 3x + 3$
When $x = 2$ then $840x + 3$, is divisible by 9.
$\therefore$ Required number
= 840 × 2 + 3 = 1683

147. (4) A 3–digit number
= $100x + 10y + z$
Sum of digits = $x + y + z$
Difference
= $100x + 10y + z - x - y - z$
= $99x + 9y = 9(11x + y)$ i.e., multiple of 9.

148. (1)
```
 84 ) 8961 (106
      84
      --
      561
      504
      ---
      ×57  ⇒ Remainder
```

$\therefore$ Required number = 84 – 57
= 27

149. (1) Number of numbers lying between 67 and 101
$\Rightarrow 101 - 67 - 1 = 33$
Prime numbers $\Rightarrow$ 71, 73, 79, 83, 89 and 97 = 6
$\therefore$ Composite numbers
$= 33 - 6 = 27$

150. (3) LCM of 9, 11 and 13
$= 9 \times 11 \times 13 = 1287$
$\therefore$ Required lowest number that leaves 6 as remainder
$= 1287 + 6 = 1293$
$\therefore$ Required answer
$= 1294 - 1293 = 1$

151. (3) A number is divisible by 8 if number formed by the last three digits is divisible by 8.
$\therefore$ If * is replaced by 3, then $632 \div 8 = 79$

152. (4) 87) 13851 (159
87
515
435
801
783
18
$\therefore$ Required number
$= 87 - 18 = 69$

153. (2) If the sum of the digits of a number be divisible by 9, the number is divisible by 9.
Sum of the digits of 451 * 603
$= 4 + 5 + 1 + * + 6 + 0 + 3$
$= 19 + *$
If $* = 8$, then $19 + 8 = 27$ which is divisible by 9.

154. (2) The largest 4-digit number = 9999
88) 9999 (113
88
119
88
319
264
55 $\Rightarrow$ Remainder
$\therefore$ Required number
$= 9999 - 55 = 9944$

155. (1) A number is divisible by 99 if it is divisible by 9 and 11 both.
Sum of the digits of the number 57717
$= 5 + 7 + 7 + 1 + 7 = 27$ which is divisible by 9.
Difference between the sum of digits at odd and even places = $(7 + 7 + 5) - (7 + 1)$
$= 19 - 8 = 11$ which is a multiple of 11.
$\therefore$ Required number = 57717

156. (3) Prime numbers between 58 and 68 $\Rightarrow$ 59, 61 and 67
$\therefore$ Required sum = $59 + 61 + 67$
$= 187$

157. (3) Let the two digit number be $10x + y$.
According to the question,
$xy = 24$ .... (i)
and, $10x + y + 45 = 10y + x$
$\Rightarrow 10y + x - 10x - y = 45$
$\Rightarrow 9y - 9x = 45$
$\Rightarrow 9(y - x) = 45$
$\Rightarrow y - x = \frac{45}{9} = 5$ ... (ii)
$\therefore (x + y)^2 = (y - x)^2 + 4xy$
$= 5^2 + 4 \times 24$
$= 25 + 96 = 121$
$\Rightarrow x + y = \sqrt{121} = 11$ ... (iii)
On adding equations (ii) and (iii),
$y - x + x + y = 5 + 11$
$\Rightarrow 2y = 16 \Rightarrow y = 8$
$\therefore xy = 24 \Rightarrow 8x = 24$
$\Rightarrow x = \frac{24}{8} = 3$
$\therefore$ Required number $= 10x + y = 10 \times 3 + 8 = 38$

4. (3) A number is divisible by 11 if the difference between the sum of digits at odd places and that at even places is either zero or a multiple of 11.
Sum of the digits at odd places = $6 + 8 + 5 = 19$
Sum of the digits at even places $= 9 + 6 + 7 = 22$
$\therefore$ Required number=22–19 = 3

6. (3) According to the question,
First number $= \frac{2 + 2 \times 5}{3}$
$= \frac{12}{3}$
$= 4$
$\therefore$ Second number $= \frac{48}{4} = 12$

TYPE-III

1. (3) $\because$ 135 Litres = $\frac{1}{4}th$ part
180 Litres $= \frac{1}{4} \times \frac{180}{135} = \frac{1}{3}$

2. (1) $? = 369 \times \frac{1}{2} \times \frac{2}{3} = 123$

3. (3) Let the number be x.
$\therefore$ According to question,
$\frac{x}{5} - \frac{x}{7} = 10 \Rightarrow \frac{7x - 5x}{35} = 10$
$\Rightarrow \frac{2x}{35} = 10$
$\Rightarrow x = \frac{10 \times 35}{2} = 175$

4. (2) Let the amount be ₹ x
$\therefore$ According to question,
$\frac{8}{3}x - \frac{3}{8}x = 55$
$\Rightarrow \frac{64x - 9x}{24} = 55$
$\Rightarrow \frac{55x}{24} = 55$ or, x = ₹ 24

5. (1) Let the total number of students in a class be x
$\therefore$ According to question,
Number of girls $= \frac{3}{5}x$
and number of boys $= x - \frac{3x}{5}$
$= \frac{2}{5}x$
Number of girls who are absent
$= \frac{3}{5} \times \frac{2}{9}x = \frac{6x}{45}$
and number of boys who are absent
$= \frac{2}{5} \times \frac{1}{4} \times x = \frac{x}{10}$
$\therefore$ Total number of students who are present
$= x - \frac{6x}{45} - \frac{x}{10}$
$= \frac{(90 - 12 - 9)x}{90}$
$= \frac{69x}{90} = \frac{23x}{30}$
Therefore, the $\frac{23}{30}$ part of the students are present in the class.

6. (4) Let the longer part be x
$\therefore$ According to question,
Shortest part $= \frac{2x}{3}$
$\therefore x + \frac{2}{3}x = 85m$
$\Rightarrow \frac{3x + 2x}{3} = 85$
$\Rightarrow \frac{5x}{3} = 85$
$\therefore x = 51m$

7. (1) $\frac{2}{5}$ and $\frac{4}{9} = 0.40$ and 0.44
Fraction between these two
$= \frac{3}{7} = 0.42$

8. (1) $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$

9. (1) Suppose required number is x Then,

$$3x - \frac{3x}{5} = 60 \Rightarrow \frac{12x}{5} = 60$$

$$\Rightarrow x = \frac{60 \times 5}{12} = 25$$

10. (4) $\frac{1}{2}$ of 1%

$$= \frac{1}{2} \times \frac{1}{100} = \frac{0.01}{2} = 0.005$$

11. (1) Remaining race

$$= 5 - 1\frac{1}{4} \text{ laps}$$

$$= 5 - \frac{5}{4} \text{laps} = \frac{15}{4} \text{laps}$$

12. (2) Given

$$\frac{a}{b} \times \frac{c}{d} = \frac{14}{15} \quad \text{...(i)}$$

$$\frac{a}{b} \times \frac{d}{c} = \frac{35}{24} \quad \text{...(ii)}$$

Now multiplying both the equations

$$\frac{ac}{bd} \times \frac{ad}{bc} = \frac{14}{15} \times \frac{35}{24}$$

$$\Rightarrow \frac{a^2}{b^2} = \frac{49}{36} \Rightarrow \frac{a}{b} = \frac{7}{6}$$

$$\therefore \frac{c}{d} = \frac{14}{\frac{15}{7}} = \frac{4}{5}$$

But the greater fraction is $\frac{7}{6}$.

13. (1) Let the fraction be x.

$$\therefore \frac{4x}{7} + \frac{4}{7} = \frac{15}{14}$$

$$\Rightarrow \frac{4x}{7} = \frac{15}{14} - \frac{4}{7} = \frac{15-8}{14} = \frac{1}{2}$$

$$\Rightarrow x = \frac{1}{2} \times \frac{7}{4} = \frac{7}{8}$$

14. (2) Let the value of estate be ₹ x
According to the question

$$\frac{4}{5} \text{ of } x = 16800$$

$$\therefore x = \frac{16800 \times 5}{4} = ₹\ 21000$$

$$\therefore \frac{3}{7} \text{ of the value } = 21000 \times \frac{3}{7}$$

$$= 3000 \times 3 = ₹\ 9000$$

15. (2) Let the fraction = x
According to the question;

$$\frac{6}{7} \text{of } x = \frac{x}{\frac{6}{7}} - \frac{13}{70}$$

$$\Rightarrow \frac{6x}{7} = \frac{7x}{6} - \frac{13}{70}$$

$$\Rightarrow \frac{7x}{6} - \frac{6x}{7} = \frac{13}{70}$$

$$\Rightarrow \frac{49x - 36x}{42} = \frac{13}{70}$$

$$\Rightarrow \frac{13x}{42} = \frac{13}{70}$$

$$\therefore x = \frac{13 \times 42}{70 \times 13} = \frac{3}{5}$$

16. (3) Let the number is x.
According to the question

$$\frac{1}{2} \text{of} \frac{3}{4} \text{of } x = 2\frac{1}{2} \text{ of } 10$$

$$\Rightarrow \frac{3x}{8} = \frac{5}{2} \times 10$$

$$\Rightarrow x = \frac{5 \times 10 \times 8}{3 \times 2} = \frac{200}{3} = 66\frac{2}{3}$$

17. (4) Let the number be x.

$$\therefore \frac{x}{3 \times 4} = 15$$

$$\Rightarrow x = 15 \times 3 \times 4 = 180$$

Now, required number

$$= \frac{3}{10} x = \frac{3}{10} \times 180 = 54$$

18. (2) 1 day = 24 × 60 minutes
∴ Required fraction

$$= \frac{45}{24 \times 60} = \frac{1}{32}$$

19. (1) Let the numerator = x and denominator = y
∴ Fraction

$$= \frac{x}{y} \text{ and } \frac{x}{y+1} = \frac{1}{2}$$

$$\Rightarrow 2x = y + 1 \Rightarrow x = \frac{y+1}{2}$$

$$\frac{x+1}{y} = 1 \Rightarrow x + 1 = y$$

$$\Rightarrow \frac{y+1}{2} + 1 = y$$

$$\Rightarrow \frac{y+1+2}{2} = y$$

$$\Rightarrow y + 3 = 2y \Rightarrow y = 3$$

$$x + 1 = 3 \Rightarrow x = 2$$

$$\therefore xy = 2 \times 3 = 6$$

20. (2) Let the number = x

$$\therefore x \times \frac{5}{6} - x \times \frac{5}{16} = 250$$

$$\Rightarrow \frac{40x - 15x}{48} = 250$$

$$\Rightarrow \frac{25x}{48} = 250$$

$$\Rightarrow x = \frac{250 \times 48}{25} = 480$$

21. (2) Let the number be x.
According to the question,

$$x = \frac{x}{5} + 20 \Rightarrow x - \frac{x}{5} = 20$$

$$\Rightarrow \frac{4x}{5} = 20$$

$$\Rightarrow x = \frac{20 \times 5}{4} = 25$$

22. (2) Let the number be x.

$$\therefore \frac{2}{3} x = \frac{25}{216x} \Rightarrow x^2 = \frac{25 \times 3}{2 \times 216}$$

$$\therefore x = \sqrt{\frac{25 \times 3}{2 \times 216}} = \sqrt{\frac{25}{144}} = \frac{5}{12}$$

23. (1) Let the length of bamboo be x metres.
∴ Length of bamboo above water

$$= x - \frac{x}{10} - \frac{5x}{8}$$

$$= \frac{40x - 4x - 25x}{40} = \frac{11x}{40}$$

According to the question,

$$\frac{11x}{40} = 2.75$$

$$\Rightarrow x = \frac{2.75 \times 40}{11} = 10 \text{ metres.}$$

24. (3) Let the man's income be ₹ x
According to the question,

$$x - \frac{x}{3} - \frac{2x}{5} - \frac{1x}{5} = 400$$

$$\text{or } x\left(1 - \frac{1}{3} - \frac{2}{5} - \frac{1}{5}\right) = 400$$

or $x\left(\frac{15-5-6-3}{15}\right)=400$

or $x\times\frac{1}{15}=400$

or $x = 15\times400 = ₹\ 6000$

25. (4) $0.\overline{47}=\frac{47}{99}$

26. (2) $\frac{6}{\frac{7}{8}}=\frac{6\times8}{7}=\frac{48}{7}$

$\frac{\frac{6}{7}}{8}=\frac{6}{7\times8}=\frac{3}{28}$

$\therefore$ Required difference

$=\frac{48}{7}-\frac{3}{28}$

$=\frac{192-3}{28}=\frac{189}{28}=\frac{27}{4}=6\frac{3}{4}$

27. (2) Let the number be x.
According to the question

$\frac{x}{9}-\frac{x}{10}=4$

$\Rightarrow\frac{10x-9x}{90}=4$

$\Rightarrow x = 90\times4 = 360$

28. (2) $0.4\overline{23}=\frac{423-4}{990}=\frac{419}{990}$

29. (3) Decimal equivalent of :

$\frac{3}{4}=0.75$ and $\frac{5}{6}=0.833$

Now, $\frac{2}{3}=0.66$, $\frac{1}{2}=0.5$,

$\frac{4}{5}=0.8$ and $\frac{9}{10}=0.9$

Clearly, $\frac{4}{5}$ lies between $\frac{3}{4}$ and $\frac{5}{6}$.

30. (4) Let the tin contain x bottles of oil.
As given,

$\frac{4}{5}x-6+4=\frac{3}{4}x$

$\Rightarrow\frac{4}{5}x-\frac{3}{4}x=2$

$\Rightarrow\left(\frac{16-15}{20}\right)x=2$

$\Rightarrow\frac{x}{20}=2$

$\Rightarrow x = 2\times20 = 40$

$\therefore$ The tin can contain 40 bottles.

31. (1) Let the required number be x.
As given,

$\Rightarrow x\times\frac{5}{4}-x\times\frac{5}{14}=25$

$\Rightarrow5x\left(\frac{1}{4}-\frac{1}{14}\right)=25$

$\Rightarrow5x\left(\frac{7-2}{28}\right)=25\Rightarrow5x\times\frac{5}{28}=25$

$\Rightarrow x=\frac{25\times28}{5\times5}=28$

32. (2) Let the number be x.
Then,

$\frac{3}{4}x-\frac{3}{14}x=150$

$\Rightarrow\frac{21x-6x}{28}=150$

$\Rightarrow15x = 28\times150$

$\Rightarrow x=\frac{28\times150}{15}=280$

33. (2) Let the fractions be x and y, where $x > y$

$\therefore xy=\frac{14}{15}$ and $\frac{x}{y}=\frac{35}{24}$

$\therefore xy\times\frac{x}{y}=\frac{14}{15}\times\frac{35}{24}$

$\Rightarrow x^2=\frac{49}{36}$

$\Rightarrow x=\frac{7}{6}$

34. (3) The required fraction is $\frac{4}{5}$,

because $\frac{5}{4}-\frac{4}{5}=\frac{25-16}{20}=\frac{9}{20}$

35. (2) Let the fraction be x,
According to the question,

$\frac{x}{\frac{3}{5}}-x\times\frac{3}{5}=\frac{32}{75}$

$\Rightarrow\frac{5x}{3}-\frac{3x}{5}=\frac{32}{75}$

$\Rightarrow\frac{25x-9x}{15}=\frac{32}{75}$

$\Rightarrow\frac{16x}{15}=\frac{32}{75}$

$\Rightarrow x=\frac{32}{75}\times\frac{15}{16}=\frac{2}{5}$

Correct answer $=\frac{2}{5}\times\frac{3}{5}=\frac{6}{25}$

36. (2) Required number

$=\frac{3+1}{2+5}=\frac{4}{7}$ or

$\frac{1}{2}=0.5;\frac{3}{5}=0.6$

$\frac{4}{7}=0.57$

Clearly, $0.5 < 0.57 < 0.6$

37. (3) Let the number of pages in the book be x.
According to the question,

$\frac{2x}{5}+\frac{2x}{5}+\frac{x}{3}\times\frac{2}{5}+15=x$

$\Rightarrow\frac{4x}{5}+\frac{2x}{15}+15=x$

$\Rightarrow\frac{12x+2x+225}{15}=x$

$\Rightarrow 15x = 14x + 225$
$\Rightarrow 15x - 14x = 225$
$\Rightarrow x = 225$

38. (3) 0.121212 ....

$=0.\overline{12}=\frac{12}{99}=\frac{4}{33}$

39. (2) $0.\overline{001}=\frac{1}{999}$

40. (3) $1.\overline{27}=1\frac{27}{99}=1\frac{3}{11}=\frac{14}{11}$

41. (1) Let the number be x.

$\therefore\frac{x}{7}-\frac{x}{11}=100$

$\Rightarrow\frac{11x-7x}{11\times7}=100$

$\Rightarrow4x = 77\times100$

$\Rightarrow x=\frac{77\times100}{4}=1925$

42. (1) $\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}$

$=\frac{1}{3\times5}\times\frac{1}{5\times7}+\frac{1}{7\times9}$

$+\frac{1}{9\times11}+\frac{1}{11\times13}$

$=\frac{1}{2}\left(\frac{1}{3}-\frac{1}{5}+\frac{1}{5}-\frac{1}{7}+\frac{1}{7}-\frac{1}{9}+\frac{1}{9}-\frac{1}{11}+\frac{1}{11}-\frac{1}{13}\right)$

$=\frac{1}{2}\left(\frac{1}{3}-\frac{1}{13}\right)=\frac{1}{2}\left(\frac{13-3}{39}\right)=\frac{5}{39}$

43. (4) $2.\dot{5}\dot{2} = 2\frac{52}{99}=\frac{250}{99}$

$\therefore$ Required sum
= 250 + 99 = 349

44. (1) Let the length of the rod be x metres. According to the question,

$x-\left(\frac{x}{10}+\frac{x}{20}+\frac{x}{30}+\frac{x}{40}+\frac{x}{50}+\frac{x}{60}\right)$
=12.08

$\Rightarrow x\left[1-\left(\frac{60+30+20+15+12+10}{600}\right)\right]$
= 12.08

$\Rightarrow x\left(1-\frac{147}{600}\right)=12.08$

$\Rightarrow x\left(\frac{600-147}{600}\right)=12.08$

$\Rightarrow x\times\frac{453}{600}=12.08$

$\Rightarrow x=\frac{12.08\times600}{453}$ =16 m.

45. (4) Height of tree after 1 year

$=64+64\times\frac{1}{8}=72$ cm

Height of tree after 2 years

$=72+72\times\frac{1}{8}$

= 72 + 9 = 81 cm

46. (1) Suppose total income
= ₹ x

$\therefore\ x-\frac{x}{4}-\frac{2x}{3}=630$

$\frac{x}{12}=630\ \ \therefore x=7560$

$\therefore$ House rent $=\frac{2}{3}\times7560$

= ₹ 5040

47. (3) Required answer

$=\frac{\frac{125}{3}}{\frac{1}{6}}=\frac{125}{3}\times6=250$

48. (2) $\frac{5}{8}=0.625$; $\frac{7}{11}=0.636$

$\frac{20}{30}=0.666\ldots$; $\frac{19}{30}=0.633\ldots$

49. (3) Let numerator be x, then denominator = $11-x$.

$\therefore$ Fraction = $\frac{x}{11-x}$

Again, $\frac{x+2}{11-x+2}$

$=\frac{x}{11-x}+\frac{1}{24}$

$\Rightarrow\frac{x+2}{13-x}-\frac{x}{11-x}=\frac{1}{24}$

$\Rightarrow\frac{11x-x^2+22-2x-13x+x^2}{(13-x)(11-x)}$

$=\frac{1}{24}$

$\Rightarrow\frac{22-4x}{(13-x)(11-x)}=\frac{1}{24}$

$\Rightarrow 528-96x=143-24x+x^2$
$\Rightarrow x^2+72x-385=0$
$\Rightarrow x^2+77x-5x-385=0$
$\Rightarrow x(x+77)-5(x+77)=0$
$\Rightarrow (x-5)(x+77)=0\Rightarrow x=5$
$\therefore$ Denominator = 11 – 5 = 6
$\therefore$ Difference = 6 – 5 = 1

50. (2) Let the original fraction be $\frac{x}{x+3}$.

$\therefore\ \frac{x+7}{x+3-2}=2$

$\Rightarrow x+7=2x+2$
$\Rightarrow x=7-2=5$
$\therefore$ Required sum = $x+x+3$
$=2x+3=10+3=13$

51. (1) Let the original fraction be $\frac{x}{y}$.

$\therefore\ \frac{x-1}{y-1}=\frac{1}{3}\Rightarrow 3x-3=y-1$

$\Rightarrow 3x-y=2$ .....(i)

Again, $\frac{x+1}{y+1}=\frac{1}{2}\Rightarrow 2x+2=y+1$

$\Rightarrow 2x-y=-1$ ....(ii)

From equation (i) – (ii)
$3x-y-2x+y=2+1$
$\Rightarrow x=3$
From equation (i)
$3\times3-y=2\Rightarrow y=9-2=7$
$\Rightarrow x+y=3+7=10$

52. (4) Let the number be x.

$\frac{\frac{x}{7}}{8}-\frac{7x}{8}=15$

$\Rightarrow\frac{8x}{7}-\frac{7x}{8}=15$

$\Rightarrow\frac{64x-49x}{56}=15$

$\Rightarrow\frac{15x}{56}=15$

$\Rightarrow x=56$
$\therefore$ Sum of the digit = 5 + 6 = 11

53. (3) Let the given number be x.

$\therefore\ \frac{\frac{x}{8}}{17}-\frac{8x}{17}=225$

$\Rightarrow\frac{17x}{8}-\frac{8x}{17}=225$

$\Rightarrow\frac{289x-64x}{136}=225$

$\Rightarrow\frac{225x}{136}=225\Rightarrow x=136$

54. (1) Let the original fraction be $\frac{x}{y}$.

$\therefore\ \frac{x+1}{y+1}=\frac{1}{4}$

$\Rightarrow 4x+4=y+1$
$\Rightarrow 4x-y=-3$ ...(i)
In case II,

$\frac{x+2}{y+2}=\frac{1}{3}$

$\Rightarrow 3x+6=y+2$
$\Rightarrow 3x-y=-4$ ...(ii)
By (i) – (ii),
$4x-y-3x+y=-3+4$
$\Rightarrow x=1$
From (i),
$4\times1-y=-3\Rightarrow y=7$
$\therefore x+y=1+7=8$

55. (2) Let the number be x.

$\therefore \frac{x}{5}+4=\frac{x}{4}-10$

$\Rightarrow \frac{x}{4}-\frac{x}{5}=10+4=14$

$\Rightarrow \frac{5x-4x}{20}=14$

$\Rightarrow x = 20 \times 14 = 280$

56. (2) Part of the property given away

$=\frac{1}{4}+\frac{1}{2}+\frac{1}{5}$

$=\frac{5+10+4}{20}=\frac{19}{20}$

57. (2) Unbroken tables

$=\frac{5}{6}\times 108 = 90$

Unbroken chairs $=\frac{3}{4}\times 132 = 99$

Unbroken pairs = 90

58. (2) A + B + C + D = 60

$A=\frac{B+C+D}{2}$

$\Rightarrow 3A = 60 \Rightarrow A = ₹\ 20$

$B=\frac{A+C+D}{3}$

$\Rightarrow 4B = 60 \Rightarrow B = ₹\ 15$

$C=\frac{A+B+D}{4}$

$\Rightarrow 5C = 60 \Rightarrow B = ₹\ 12$

D = 60 – (20 + 15 + 12) = ₹ 13

59. (2) If the number of boys be x, and that of girls be y, then

$\frac{x}{10}=\frac{y}{4}\Rightarrow\frac{x}{y}=\frac{10}{4}=\frac{5}{2}=5:2$

60. (1) Solve this question by options.

Original fraction $=\frac{7}{9}$

Adding 2 to numerator and denominator, fraction $=\frac{9}{11}$

Adding 3 to numerator and denominator, fraction $=\frac{10}{12}$

$=\frac{5}{6}$, which is correct.

61. (4) $\frac{3}{4}=\frac{3\times4}{4\times4}=\frac{12}{16}$

$\frac{3}{8}=\frac{6}{16}$

$\therefore \frac{6}{16},\frac{7}{16},\frac{8}{16},\frac{9}{16},\frac{10}{16},\frac{11}{16},\frac{12}{16}$

$\therefore$ Required rational number

$=\frac{9}{16}$

$\frac{12}{9},\frac{7}{3},\frac{16}{9}$ are all greater than 1, only $\frac{9}{16}<1$, hence it is the obvious choice)

62. (2) Original fraction $=\frac{x-4}{x}$

In case II,

$8(x-4-2)=x+1$

$\Rightarrow 8x-48=x+1$

$\Rightarrow 7x=49 \quad \Rightarrow x=7$

$\therefore$ Original fraction

$=\frac{7-4}{7}=\frac{3}{7}$

63. (3) Boys = x

Girls = $z-x$

$\therefore$ Part of girls $=\frac{z-x}{z}=1-\frac{x}{z}$

64. (2) First part = x,

Second part = $50-x$

$\therefore \frac{1}{x}+\frac{1}{50-x}=\frac{1}{12}$

Put values of x from the given options. Otherwise

$\Rightarrow \frac{50-x+x}{x(50-x)}=\frac{1}{12}$

$\Rightarrow x(50-x) = 600$

$\Rightarrow x^2-50x+600=0$

$\Rightarrow x^2-30x-20x+600=0$

$\Rightarrow x(x-30)-20(x-30)=0$

$\Rightarrow (x-20)(x-30)=0$

$\Rightarrow x = 20$ or 30

65. (4) Number of seats in each bus = 10 (let)

Total passengers $=\frac{30\times4}{5}=24$

$\frac{1}{4}$ of the passengers leave the bus.

Remaining passengers

$=24\times\frac{3}{4}=18$

$\therefore$ Required answer

$=\frac{18}{20}=\frac{9}{10}$

66. (2) $0.\overline{123}=\frac{123}{999}=\frac{41}{333}$

67. (2) 0.393939 .....

$=0.\dot{3}\dot{9}=\frac{39}{99}=\frac{13}{33}$

68. (3) $\frac{1}{11}=0.0909\ldots\ldots=0.\overline{09}$

69. (2) $2.3\overline{49}=\frac{2349-23}{990}$

$=\frac{2326}{990}$

70. (3) Expression

$=\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}+\frac{1}{90}$

$=\frac{1}{4\times5}+\frac{1}{5\times6}+\frac{1}{6\times7}+$

$\frac{1}{7\times8}+\frac{1}{8\times9}+\frac{1}{9\times10}$

$=\left(\frac{1}{4}-\frac{1}{5}\right)+\left(\frac{1}{5}-\frac{1}{6}\right)\ldots\ldots+\left(\frac{1}{9}-\frac{1}{10}\right)$

$=\frac{1}{4}-\frac{1}{10}=\frac{5-2}{20}=\frac{3}{20}$

71. (1) $?=1+\frac{1}{2}+\frac{1}{4}+\frac{1}{7}+\frac{1}{14}+\frac{1}{28}$

$=\frac{28+14+7+4+2+1}{28}$

$=\frac{28+28}{28}=2$

72. (3) Expression

$=\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\ldots.+\frac{1}{132}$

$=\frac{1}{4\times5}+\frac{1}{5\times6}+\frac{1}{6\times7}+\ldots.+\frac{1}{11\times12}$

$=\frac{1}{4}-\frac{1}{5}+\frac{1}{5}-\frac{1}{6}+\frac{1}{6}-\frac{1}{7}+\ldots.+\frac{1}{11}-\frac{1}{12}$

$=\frac{1}{4}-\frac{1}{12}=\frac{3-1}{12}=\frac{2}{12}=\frac{1}{6}$

73. (3) The original property with Ram = ₹ x (let)

$\therefore$ Wife's share = Rs. $\frac{x}{3}$

Remaining property

$= x - \frac{x}{3} =$ ₹ $\frac{2x}{3}$

Daughter's share = $\frac{2x}{3} \times \frac{3}{5}$

= ₹ $\frac{2x}{5}$

Son's share = $\frac{2x}{3} - \frac{2x}{5}$

$= \frac{10x - 6x}{15} =$ ₹ $\frac{4x}{15}$

$\therefore \frac{4x}{15} = 6400$

$\Rightarrow 4x = 6400 \times 15$

$\Rightarrow x = \frac{6400 \times 15}{4} =$ ₹ 24000

74. (1) Let the number be x.
According to the question,

$x - \frac{2x}{5} = 75$

$\Rightarrow \frac{5x - 2x}{5} = 75$

$\Rightarrow \frac{3x}{5} = 75$

$\Rightarrow x = \frac{75 \times 5}{3} = 125$

75. (4) First number = x (let)

$\therefore$ Second number = $\frac{2x}{5}$

$\therefore x + \frac{2x}{5} = 50$

$\Rightarrow \frac{5x + 2x}{5} = 50$

$\Rightarrow 5x + 2x = 50 \times 5$

$\Rightarrow 7x = 250$

$\Rightarrow x = \frac{250}{7}$

$\therefore$ Second number

$= \frac{2}{5} \times \frac{250}{7} = \frac{100}{7}$

76. (2) Let the number be x.
According to the question,

$\frac{3x}{4} - \frac{x}{6} = 7$

$\Rightarrow \frac{9x - 2x}{12} = 7$

$\Rightarrow 7x = 12 \times 7$

$\Rightarrow x = \frac{12 \times 7}{7} = 12$

$\therefore \frac{5x}{3} = \frac{5}{3} \times 12 = 20$

77. (4) $0.39\overline{39} = 0.\overline{39}$

$= \frac{39}{99} = \frac{13}{33}$.

78. (4) $2\frac{1}{2} + 3\frac{1}{3} + 4\frac{1}{4} + 5\frac{1}{5}$

$= (2 + 3 + 4 + 5) + \left(\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}\right)$

$= 14 + \left(\frac{30 + 20 + 15 + 12}{60}\right)$

$= 14 + \frac{77}{60} = 14 + 1\frac{17}{60}$

$= 15\frac{17}{60}$

$\therefore$ Required answer = $1 - \frac{17}{60} = \frac{60 - 17}{60} = \frac{43}{60}$

79. (4) $\frac{5}{6} = 0.83$

$\frac{8}{15} = 0.53$

$\frac{6}{7} = 0.86$

Clearly, $0.53 < 0.83 < 0.86$

80. (4) Let the first number be x.
$\therefore$ Second number = $x + 2$
According to the question,
$x + 2 = 7 + c - 4 = 3 + c$
$\Rightarrow x = 1 + c$
$\therefore$ Fraction
$= \frac{x(x+2)}{7+c} = \frac{(1+c)(3+c)}{7+c}$
For the minimum value,
$-3 < c < -1$
$\therefore c = -2$
$\therefore$ Required value of fraction = $-\frac{1}{5}$

81. (2) Let second number be x.

$\therefore$ First number = $\frac{x}{2}$

Third number = $\frac{x}{4}$

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

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

$\Rightarrow 7x = 8 \Rightarrow x = \frac{8}{7}$

82. (1) Let the number be x.
According to the question,

$\left(x + \frac{1}{2}\right) \times 3 = 21$

$\Rightarrow x + \frac{1}{2} = \frac{21}{3} = 7$

$\Rightarrow x = 7 - \frac{1}{2} = \frac{13}{2} = 6.5$

83. (3) Let the number be x.
According to the question,

$\frac{4x}{5} - \frac{3x}{4} = 8$

$\Rightarrow \frac{16x - 15x}{20} = 8$

$\Rightarrow \frac{x}{20} = 8$

$\Rightarrow x = 20 \times 8 = 160$

84. (1) $\because$ A mason makes a wall in 70 hours.
$\therefore$ Part of wall built by the mason in 7 hours = $\frac{7}{70}$

$= \frac{1}{10}$

$\therefore$ Remaining part = $1 - \frac{1}{10}$

$= \frac{9}{10} = 0.9$

85. (3) Let the number of oranges in the first basket be x.
$\therefore$ Number of oranges in the second basket = $640 - x$
According to the question,

$x - \frac{x}{5} = 640 - x + \frac{x}{5}$

$= 640 - \left(x - \frac{x}{5}\right)$

$\Rightarrow \frac{4x}{5} = 640 - \frac{4x}{5}$

$\Rightarrow \frac{4x}{5} + \frac{4x}{5} = 640$

$\Rightarrow \frac{8x}{5} = 640 \Rightarrow 8x = 640 \times 5$

$\Rightarrow x = \frac{640 \times 5}{8} = 400$

TYPE-IV

1. (3) Firstly, we express every fraction in decimal form.

$\frac{4}{5} = 0.8$; $\frac{7}{8} = 0.875$

$\frac{6}{7} = 0.857$

$\frac{5}{6} = 0.833 = 0.8\dot{3}$

So, $\frac{4}{5} < \frac{5}{6} < \frac{6}{7} < \frac{7}{8}$

2. (3) The decimal equivalent of

$\frac{3}{5} = 0.6, \frac{7}{9} = 0.777..,....$

$\frac{11}{13} = 0.846$

Obviously, $0.846 > 0.\dot{7} > 0.6$

∴ The required decreasing order

$= \frac{11}{13}, \frac{7}{9}, \frac{3}{5}$

3. (3) $\frac{1}{3} = 0.333....$,

$\frac{4}{7} = 0.5714$, $\frac{2}{5} = 0.4$

Clearly,

$0.\overline{33} < 0.4 < 0.5714$

$\therefore \frac{1}{3} < \frac{2}{5} < \frac{4}{7}$

4. (2) Numbers are :

$a > b > c > d > e > f$

According to the question,

$a + b + c + d + e = 5 \times 30$

$= 150$ --- (i)

$b + c + d + e + f = 5 \times 25$

$= 125$ --- (ii)

By equation (i) – (ii)

$a - f = 150 - 125 = 25$

5. (4) Let the numbers be x, $x + 1$ and $x + 2$.

$\therefore\ x + x + 1 + x + 2 = 51$

$\Rightarrow 3x + 3 = 51$

$\Rightarrow 3x = 51 - 3 = 48$

$\Rightarrow x = \frac{48}{3} = 16$

∴ Middle number = 16 + 1= 17

TYPE-V

1. (1) The digit in unit's place = unit's digit in the product $1 \times 2 \times 3 \times .... \times 9 = 0$.

2. (3) Unit's digit in $3^4 = 1$

So, unit digit in $3^{164} = 1$

Now, unit's digit in $(2153)^{167}$

= unit digit in 3^{167}

= unit digit in $3^3 = 7$

3. (1)(4) $(4)^{2m}$ gives 6 at unit digit.

$(4)^{2m+1}$ gives 4 at unit digit.

$(5)^n$ gives 5.

The same is the case with 1.

∴ Required digit = Unit's digit in the product of $4 \times 5 \times 1 = 0$

4. (1) Unit digit in $(264)^4$ i.e.

$4 \times 4 \times 4 \times 4$ is 6

∴ Unit digit in

$(264)^{100}$ is also 6.

Now, $(264)^{102} = (264)^{100} \times (264)^2$

= (Unit digit 6) × (Unit digit 6)=36

∴ Unit digit is 6

Similarly,

$(264)^{103} + (264)^{100} \times (264)^3$

Unit digit Unit digit

6 4

Unit digit

4

Therefore, the unit digit in $(264)^{102} + (264)^{103}$ is 6 + 4 = 10 i.e. 0.

5. (2) $(251)^{98} = ...1$

$(21)^{29} = ...1$

$(106)^{100} = ...6$

$(705)^{35} = ...5$

$(16)^4 = ...6$

$259 = ...9$

∴ Required answer = 1 + 1 – 6 + 5 – 6 + 9 = 16 – 12 = 4

6. (1) $3^1 = 3$; $3^2 = 9$; $3^3 = 27$;

$3^4 = 81$; $3^5 = 343$; .....

∴ Remainder on dividing 40 by 4 = 0

∴ Unit's digit in $3^{40} = 1$

7. (2)

Unit digit

$7^1 \Rightarrow \boxed{7}$

$7^2 \Rightarrow 9$

$7^3 \Rightarrow 3$ 4

$7^4 \Rightarrow 1$

$7^5 \Rightarrow 7$

$7^1 \Rightarrow \boxed{7}$

4) 105 (26

8

25

24

1

8. (4) Expression = $(2137)^{754}$

Unit's digit in 2137 = 7

Now, $7^1 = 7$, $7^2 = 49$, $7^3 = 343$, $7^4 = 2401$, $7^5 = 16807$, ...

Clearly, after index 4, the unit's digit follow the same order.

Dividing index 754 by 4 we get remainder = 2

∴ Unit's digit in the expansion of $(2137)^{754}$ = Unit's digit in the expansion of $(2137)^2 = 9$

9. (3) Unit's digit in the expansion of $(22)^{23}$

= Unit's digit in the expansion of $(2)^{23}$

Now,

$2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

i.e. 2 repeats itself after the index 4.

On dividing 23 by 4, remainder = 3

∴ Unit's digit in $(2)^{23}$

= Unit's digit in $(2)^3 = 8$

10. (1) $2^1 = 2$; $2^2 = 4$;

$2^3 = 8$; $2^4 = 16$; $2^5 = 32$

∴ Unit digit in the product of $(122)^{173}$

= Unit digit in $(122)^1 = 2$

(1 = remainder when 173 is divided by 4).

11. (4) $4^1 = 4$; $4^2 = 16$; $4^3 = 64$; $4^4 = 256$; $4^5 = 1024$

Remainder on dividing 372 by 4 = 0

Remainder on dividing 373 by 4 = 1

∴ Required unit digit

= Unit digit of the sum of 6 + 4 = 0

12. (2) Last digit of $(1001)^{2008} + 1002$ = 1 + 2 = 3

13. (4) $7^1 = 7$; $7^2 = 49$; $7^3 = 343$;

$7^4 = 2401$; $7^5 = 16807$

i.e. The unit's digit repeats itself after power 4.

Remainder after we divide 245 by 4 = 1

∴ Unit's digit in the product of $(4387)^{245} \times (621)^{72}$ = Unit's digit in the product of $(4387)^1 \times (621)^{72}$ = 7 × 1 = 7

14. (4) Unit digit in the expansion of 25^{6251}

= Unit digit in the expansion of $5^{6251} = 5$

$36^{528} \equiv$ Unit digit in $6^{528} = 6$

Now, $3^1 = 3$, $3^2 = 9$, $3^3 = 27$; $3^4 = 81$, $3^5 = 243$....

$\therefore 73^{54} = 73^{52} \times 73^2$

$\equiv 3^2 = 9$

$\therefore$ Required digit = Unit's digit of the sum 5 + 6 + 9 = 0

15. (4) $7^1 = 7$, $7^2 = 49$, $7^3 = 343$, $7^4 = 2401$

$3^1 = 3$, $3^2 = 9$, $3^3 = 27$, $3^4 = 81$

i.e. the digit at unit's place gets repeated after power 4. Unit 6 remains same for any power.

$\therefore$ Required unit's digit

= Unit's digit in the product of $7^3 \times 6 \times 3^1 = 4$

16. (1) Unit's digit in $(1570)^2 = 0$

Unit's digit in $(1571)^2 = 1$

Unit's digit in $(1572)^2 = 4$

Unit's digit in $(1573)^2 = 9$

$\therefore$ Required unit's digit

= Unit's digit (0 +1+4 + 9) = 4

17. (4) Unit's digit in 3 × 38 × 537 × 1256

= Unit's digit in 3 × 8 × 7 × 6

= 4 × 2 = 8

18. (4) Ten's digit = x

Unit's digit = $2x - 1$

$\therefore$ Original number

= $10x + (2x - 1)$

= $12x - 1$

New number = $10(2x - 1) + x$

= $20x - 10 + x = 21x - 10$

$\therefore (21x - 10) - (12x + 1)$

= $12x - 1 - 20$

$\Rightarrow 9x - 9 = 12x - 21$

$\Rightarrow 3x = 12 \Rightarrow x = 4$

$\Rightarrow$ Original number = $12x - 1$

= 12 × 4 − 1 = 47

[check through options].

19. (1) Required unit's digit

= Unit's digit in the product of 7 × 5 × 8 × 3 × 9 = 0

20. (1) Let the two–digit number be $10x + y$ where $x < y$.

Number obtained on reversing the digits = $10y + x$

According to the question,

$10y + x = 4(10x + y) - 24$

$\Rightarrow 40x + 4y - 10y - x = 24$

$\Rightarrow 39x - 6y = 24$

$\Rightarrow 13x - 2y = 8$ ....(i)

Again, $y - x = 7$

$\Rightarrow y = x + 7$ ....(ii)

$\therefore 13x - 2(x + 7) = 8$

$\Rightarrow 13x - 2x - 14 = 8$

$\Rightarrow 11x = 14 + 8 = 22$

$\Rightarrow x = \frac{22}{11} = 2$

From equation (ii),

$y - 2 = 7 \Rightarrow y = 2 + 7 = 9$

$\therefore$ Number = $10x + y = 10 \times 2 + 9 = 29$

21. (3) Ten's digit of original number = x

$\therefore$ Unit's digit = $2x$

$\therefore$ Number = $10x + 2x = 12x$

According to the question,

$3x - 2 = \frac{1}{6} \times 12x$

$\Rightarrow 3x - 2 = 2x$

$\Rightarrow 3x - 2x = 2$

$\Rightarrow x = 2$

$\therefore$ Number = $12x = 12 \times 2 = 2 = 24$

TYPE-VI

1. (3) $\therefore$ x + x + 2 + x + 4 = 147

$\Rightarrow$ 3 x + 6 = 147

$\Rightarrow$ 3 x = 147 − 6 = 141

$\Rightarrow x = \frac{141}{3} = 47$

$\therefore$ Middle Number

= x + 2 = 47 + 2 = 49

2. (3) Series of first 20 odd natural numbers is an arithmetic progression with 1 as the first term and the common difference 2.

Sum of n terms in arithmetic progression is given by.

$S_n = \frac{1}{2}n[2a + (n-1)d]$

Where a : First term

d : common difference

$\therefore S_{20} = \frac{1}{2} \times 20[(2 \times 1) + (20 - 1) \times 2]$

= 10 [2 + 38]=10 × 40 = 400

Note : Sum of first n consecutive odd numbers = n^2

3. (4) Series of all natural numbers from 75 to 97 is in A.P. whose first term,

a = 75, last term, $l = 97$

If number of terms be n, then

$a_n = a + (n-1)d$

$\Rightarrow 97 = 75 + (n - 1)$

$\Rightarrow n = 97 - 74 = 23$

$S_n = \frac{n}{2}(a + l)$

$S_{23} = \frac{23}{2}(75 + 97)$

$= \frac{23}{2} \times 172 = 1978$

4. (2) Numbers divisible by 3 and lying between 100 and 200 are : 102, 105,..... 198

Let number of terms = n

$\therefore$ 198 = 102 + $(n-1)$ 3

$\Rightarrow n - 1 = \frac{198 - 102}{3} = 32$

$\Rightarrow n = 33$

$\therefore S = \frac{n}{2} = (a + l)$

$= \frac{32}{2}(102 + 198) = 4950$

5. (2) Let the three consecutive natural numbers be x, x + 1 and x + 2.

$\therefore$ According to question,

$x^2 + (x + 1)^2 + (x + 2)^2 = 2030$

or $x^2 + x^2 + 2x + 1 + x^2 + 4x + 4 = 2030$

or $3x^2 + 6x + 5 = 2030$

or $3x^2 + 6x - 2025 = 0$

or $x^2 + 2x - 675 = 0$

or $x^2 + 27x - 25x - 675 = 0$

x (x + 27) − 25 (x + 27) = 0

or (x − 25) (x + 27) = 0

$\therefore$ x = 25 and − 27

$\therefore$ Required number = x + 1

= 25 + 1 = 26

6. (4) Let the three odd consecutive natural numbers be x, x + 2 and x + 4.

$\therefore$ According to the question

x + x + 2 + x + 4 = 87

or 3x + 6 = 87

or 3x = 81 $\therefore$ x = 27

$\therefore$ Smallest number = 27

7. (4) Let three consecutive even integers be 2x, 2x + 2 and 2x + 4 respectively.

$\therefore$ 2x + 2x + 2 + 2x + 4 = 54

$\Rightarrow$ 6x + 6 = 54

$\Rightarrow$ 6x = 54 − 6 = 48

$\Rightarrow$ x = 8

$\therefore$ The least even number

= 2 × 8 = 16

8. (2) Let three consecutive natural numbers be x, $x+1$, $x+2$.
According to the question,
$x + x + 1 + x + 2 = 87$
$\Rightarrow 3x + 3 = 87$
$\Rightarrow 3x = 84 \Rightarrow x = \frac{84}{3} = 28$
$\therefore$ Middle number = 28 + 1 = 29
OR, $\frac{87}{3} = 29$

9. (3) $(x+2)^2 - x^2 = 84$
or $x^2 + 4x + 4 - x^2 = 84$
or $4x = 84 - 4 = 80$
or $x = \frac{80}{4} = 20$
$\Rightarrow x + 2 = 20 + 2 = 22$
$\therefore$ The required sum
= 20 + 22 = 42

10. (4) We have,
$1 + 2 + 3 \ldots\ldots\ldots + n$
$= \frac{n(n+1)}{2}$
$\therefore 51 + 52 + \ldots\ldots + 100$
= (1 + 2 + ... 100) – (1 + 2 + ... + 50)
$= \frac{100 \times 101}{2} - \frac{50 \times 51}{2}$
= 5050 – 1275 = 3775

11. (4) The two-digit numbers are :
10, 11, 12, ... 97, 98, 99
We know that,
$1+ 2 + 3 + 4 + \ldots\ldots + n$
$= \frac{n(n+1)}{2}$
$\therefore$ Required sum = (1 + 2 + 3 + ...+ 99)–(1+2+ ..... + 9)
$= \frac{99(99+1)}{2} - \frac{9(9+1)}{2}$
= 4950 – 45 = 4905

12. (4) S = 1 + 3 + 5 + ... to 50 terms
Here, $a = 1$
$d = 3 - 1 = 2$
$n = 50$
$\therefore\ S = \frac{n}{2}[2a + (n-1)d]$
$= \frac{50}{2}[2 \times 1 + (50-1) \times 2]$
= 25 (2 + 98) = 25 × 100
= 2500

13. (4) According to the question,
First number $= a = 103$
Last number $= l = 998$
$\therefore$ If the number of such numbers be n, then,
$998 = 103 + (n-1) \times 5$
$\Rightarrow (n-1) \times 5 = 998 - 103 = 895$
$\Rightarrow n - 1 = \frac{895}{5} = 179$
$\Rightarrow n = 180$
$\therefore\ S = \frac{n}{2}(a + l)$
$= \frac{180}{2}(103 + 998)$
= 90 × 1101 = 99090

14. (2) First 3 – digit number = 100
Last 3 – digit number = 999
Number of terms = 900
$\therefore\ S = \frac{n}{2}[a + l]$
$= \frac{900}{2}[100 + 999]$
= 450 × 1099 = 494550

15. (1) $x + x + 1 + x + 2 = 27$
$3x + 3 = 27$
$3x = 24$
$x = 8$
$\therefore$ Three consecutive no's whose sum is 27 are 8, 9,10. Hence, next 3 consecutive no's having 36 as sum are 11, 12 and 13

16. (3) $\because 1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$
$\therefore 1 + 2 + 3 + .. + 25$
$= \frac{25(25+1)}{2} = 25 \times 13$
Hence, 13 is a factor of required sum.

17. (2) 22 + 24 + 26 + ... + 50
= 2 (11 + 12 + 13 + ... + 25)
= 2 [(1 + 2 + 3 + ... + 25)
– (1 + 2 + 3 ... + 10)]
$= 2\left(\frac{25 \times 26}{2} - \frac{10 \times 11}{2}\right)$
= 2 (325 – 55) = 2 × 270 = 540
Method 2 :
Tricky Approach
Sum of first n even numbers
$= n(n + 1)$
$\therefore$ Required sum = Sum of 25 even numbers from 1 to 50 – sum of 10 even numbers from 1 to 20
= 25×26 – 10 × 11 = 650 – 110
= 540

18. (3) $x + x + 2 + x + 4 + x + 6 = 748$
$\Rightarrow 4x + 12 = 748$
$\Rightarrow 4x = 748 - 12 = 736$
$\Rightarrow x = \frac{736}{4} = 184$

19. (4) Sum of five consecutive integers = S
$\therefore$ Third integer = $\frac{S}{5}$
$\therefore$ Largest integer = $\frac{S}{5} + 2$
$= \frac{S+10}{5}$

20. (2) Prime numbers upto 17
$\Rightarrow$ 2, 3, 5, 7, 11, 13, 17
$\therefore$ Required sum = 2 + 3 + 5 + 7 + 11 + 13 + 17 = 58

21. (2) $10^2 + 11^2 + 12^2$
= 100 + 121 + 144 = 365
$\therefore$ Required sum =10 + 11 + 12 = 33

22. (3) Numbers = x, $x+1$ and $x+2$
$\therefore\ 2x + 3x + 3 + 4x + 8 = 191$
$\Rightarrow 9x = 191 - 11 = 180$
$\Rightarrow x = 20$
$\therefore$ Numbers = 20, 21 and 22

23. (3) Let the numbers be 3x, 3x + 3 and 3x + 6
$\therefore$ 3x + 3x + 3 + 3x + 6 = 72
$\Rightarrow$ 9x + 9 = 72
$\Rightarrow$ 9x = 72 – 9 = 63
$\Rightarrow x = \frac{63}{9} = 7$
$\therefore$ Largest number
= 3x + 6 = 3 × 7 + 6 = 27

24. (3) Sum of all multiples of 3 upto 50
= 3 + 6 + ... + 48
= 3 (1 + 2 + 3 + ... + 16)
$= \frac{3 \times 16(16+1)}{2} = 3 \times 8 \times 17$
= 408
$\left[\because 1 + 2 + 3 + \ldots\ldots + n = \frac{n(n+1)}{2}\right]$

25. (4) Sum of first n odd natural numbers $= n^2 = (20)^2 = 400$
$\therefore$ Required average = $\frac{400}{20} = 20$

26. (3) Let the numbers be x and y.
According to the question,
$x + 2y = 8$ .... (i)
$x - y = 2$ ..... (ii)
By equation (i) – (ii),
$2y + y = 8 - 2$
$\Rightarrow 3y = 6 \Rightarrow y = 2$
From equation (ii),
$x - 2 = 2 \Rightarrow x = 4$

27. (3) Let the numbers be : $3x$, $3x+3$ and $3x+6$

According to the question,

$3x + 3x + 3 + 3x + 6 = 45$

$\Rightarrow 9x + 9 = 45$

$\Rightarrow 9x = 45 - 9 = 36$

$\Rightarrow x = \frac{36}{9} = 4$

$\therefore$ The smallest number

$= 3x = 3 \times 4 = 12$

28. (4) Let the required largest number be x.

According to the question,

$x + x - 5 + x - 10 = 225$

$\Rightarrow 3x - 15 = 225$

$\Rightarrow 3x = 225 + 15 = 240$

$\therefore x = \frac{240}{3} = 80$

TYPE-VII

1. (2) Check through options

The numbers are : 8, 12, 5, 20

2. (3) $12345679 \times 72 = 888888888$

3. (4) Given : $0.111..... = \frac{1}{9}$

$0.444..... = 4 \times 0.111....$

$= 4 \times \frac{1}{9} = \frac{4}{9}$

4. (3) $8.3\dot{1} = 8\frac{31-3}{90}$

$= 8\frac{28}{90} = \frac{748}{90}$

$0.\dot{6} = \frac{6}{9}$

$0.00\dot{2} = \frac{2}{900}$

$\therefore 8.3\dot{1} + 0.\dot{6} + 0.00\dot{2}$

$= \frac{748}{90} + \frac{6}{9} + \frac{2}{900}$

$= \frac{7480 + 600 + 2}{900} = \frac{8082}{900}$

$= 8 = \frac{8082}{900} = 8\ \frac{979-97}{900}$

$= 8.97\dot{9}$

5. (2) Expression $= 0.\overline{63} + 0.\overline{37}$

$= \frac{63}{99} + \frac{37}{99} = \frac{100}{99}$

6. (3) Expression

$= \left(0.\overline{11} + 0.\overline{22}\right) \times 3$

$= \left(\frac{11}{99} + \frac{22}{99}\right) \times 3$

$= \frac{33}{99} \times 3 = \frac{99}{99} = 1$

7. (2) $\frac{1}{5} + \left(999 + \frac{494}{495}\right) \times 99$

$= \frac{1}{5} + \left(999 + 1 - \frac{1}{495}\right) \times 99$

$= \frac{1}{5} + 999 \times 99 + 99 - \frac{99}{495}$

$= \frac{1}{5} + 98901 + 99 - \frac{1}{5} = 99000$

8. (2) $(1 * 2) * 3 = (1 + 2 \times 6) * 3$

$= 13 * 3 = (13 + 3 \times 6)$

$= 13 + 18 = 31$

9. (2) The given expression

$= 999\frac{995}{999} \times 999$

$= \left(999 + \frac{995}{999}\right)999$

$= 999 \times 999 + \frac{995}{999} \times 999$

$= (1000 - 1)\ 999 + 995$

$= 999000 - 999 + 995$

$= 999000 - 4 = 998996$

10. (4) Expression $= 1.\overline{2} \times 0.\overline{03}$

$= 1\frac{2}{9} \times \frac{3}{99} = \frac{11}{9} \times \frac{3}{99} = \frac{1}{27}$

$= 0.\overline{037}$

11. (1) $3.718 = \frac{1}{0.2689}$ (Given)

$\therefore \frac{1}{0.0003718} = \frac{10000}{3.718}$

$= 0.2689 \times 10000 = 2689$

12. (3) $\left(\sqrt{a+b}\right)^2 = a + b$

$\left(\sqrt{a} + \sqrt{b}\right)^2 = a + b + 2\sqrt{ab}$

Here, $a + b < a + b + 2\sqrt{ab}$

Clearly, $\sqrt{a+b} < \sqrt{a} + \sqrt{b}$

13. (3) $\sqrt{18225} = 135$,

$\sqrt{17956} = 134$

$\sqrt{63592} = 252.17$

In a perfect square number 2 never comes at the unit's place.

14. (3) $0.\overline{142857} \div 0.\overline{285714}$

$= \frac{142857}{999999} \div \frac{285714}{999999}$

$= \frac{142857}{285714} = \frac{1}{2}$

15. (4) $5.\overline{76} - 2.\overline{3}$

$= 5 + \frac{76}{99} - 2 - \frac{3}{9} = 3 + \frac{76}{99} - \frac{3}{9}$

$= 3 + \frac{76-33}{99} = 3 + \frac{43}{99} = 3.\overline{43}$

16. (2) $\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right).....\left(1-\frac{1}{n}\right)$

$= \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times ..... \times \frac{n-1}{n} = \frac{2}{n}$

We observe that denominator of a term cancels with the numerator of the succeeding term

17. (2) $2.8\overline{768} = 2\frac{8768-8}{9990}$

$= 2\frac{8760}{9990} = 2\frac{292}{333}$

18. (3) When we multiply 2 and 5 (at unit place) we get a zero

$\therefore$ Number of zeros = The number of zeros in the end in the product of 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190 and 200 = 24

19. (4) $77777777 \div 77 = 1010101$

20. (3) Expression

$= 8.3\overline{1} + 0.\overline{6} + 0.00\overline{2}$

$= 8.31\overline{1}$

$+0.66\overline{6}$

$+0.00\overline{2}$

$8.97\overline{9}$

21. (1) $0.\bar{2} + 0.\bar{3} + 0.\overline{32}$

$= \frac{2}{9} + \frac{3}{9} + \frac{32}{99}$

$= \frac{22+33+32}{99} = \frac{87}{99} = 0.\overline{87}$

22. (2) Expression = $0.\overline{63} + 0.\overline{37}$

$= \frac{63}{99} + \frac{37}{99} = \frac{100}{99}$

23. (2) $\frac{51.84}{4.32} = \frac{5184}{432} = 12$

$\therefore \quad \frac{0.005184}{0.432} = \frac{5184}{432} \times \frac{1}{1000}$

$= \frac{12}{1000} = 0.012$

24. (3)

$\left(\frac{2+1}{2}\right)\left(\frac{3+1}{3}\right)\left(\frac{4+1}{4}\right)....\left(\frac{120+1}{120}\right)$

$= \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times .....\times \frac{121}{120}$

$= \frac{121}{2} = 60.5$

25. (1) Let x and y be the two numbers. Then,

xy = 375 and x + y = 40

$\therefore$ Sum of reciprocals $= \frac{x+y}{xy}$

$= \frac{40}{375} = \frac{8}{75}$

26. (3) Let the two numbers be x and y.

$\therefore$ x + y = 12 and xy = 35

$\frac{1}{x} + \frac{1}{y} = \frac{y+x}{xy} = \frac{12}{35}$

27. (3) Let two numbers be x and y.

x + y = 3

$x^2 + y^2 = 12$

$\Rightarrow (x + y)^2 = (3)^2$

$\Rightarrow x^2 + y^2 + 2xy = 9$

$\Rightarrow 12 + 2xy = 9$

$\Rightarrow 2xy = -3$

$\Rightarrow xy = -\frac{3}{2}$

28. (4) Let the number of students be n.

So, each of n students got 2n chocolates

Total no. of chocolates

$= (2n) \times n = 800$

$\Rightarrow 2n^2 = 800$

$\Rightarrow n^2 = 400 \Rightarrow n = 20$

29. (3) A product gets 0 at its end when

(i) a multiple of 5 is multiplied by an even number or

(ii) a multiple of 10 is multiplied by any number.

All the given numbers are even and do not contain any multiple of 5. So, zeros at the end of the product will come only on multiplications by multiples of 10.

Multiples of 10 that lie in the given range from 2 to 100 are 10, 20, 30, 40,50, 60, 70, 80, 90 and 100. Each of these multiples will yield one zero except 100 which will yield two zeros at the end of the product.

$\therefore$ Total no. of zeros at the product = 9 + 2 = 11

30. (3) Number of digits from 1 to 9 = 9

Number of digits used in writing from 10 to 50

$= 41 \times 2 = 82$

$\therefore$ Total digits = 82 + 9 = 91

31. (3) Let the number be x.

$\therefore$ According to question,

2x + 20 = 8x – 4

or 8x – 2x = 20 + 4

or 6x = 24

$\therefore$ x = 4

32. (3) Let the original number of friends be *x*.

$\therefore \quad \frac{108}{x-3} - \frac{108}{x} = 3$

$\Rightarrow 108\left(\frac{x - x + 3}{x(x-3)}\right) = 3$

$\Rightarrow x(x - 3) = 108$

$\Rightarrow x^2 - 3x - 108 = 0$

$\Rightarrow x^2 - 12x + 9x - 108 = 0$

$\Rightarrow (x - 12) + 9(x - 12) = 0$

$\Rightarrow (x - 12)(x + 9) = 0$

$\Rightarrow x = 12$ as $x \neq -9$

$\therefore$ The number of friends who attended the picnic

$= 12 - 3 = 9$

33. (3) In 2m × 5n, the number of zeros

= n when m ≥ n

= m when m < n

Here, $128 = 2^7$

In 1 × 3 × 5 × 7 × ... × 99

multiples of 5 are 5, 15, 25, 35, 45, 55, 65, 75, 85, 95 (= 5^{10})

Clearly, 7 zeros will be found in the product.

34. (3) According to question

$x^2 + y^2 = 100$ ...(i)

$x^2 - y^2 = 28$ ...(ii)

Adding both the equations

$x^2 + y^2 = 100$

$x^2 - y^2 = 28$

$2x^2 = 128$

$\Rightarrow x^2 = 64 \quad \therefore x = 8$

From the equation (i)

$y^2 = 100 - 64 \quad \therefore y = 6$

So, x + y = 8 + 6 = 14

35. (3) $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times ... \times \frac{98}{99} \times \frac{99}{100}$

$= \frac{2}{100} = \frac{1}{50}$

36. (2) Let the numbers be *x* and *y*.

$xy = 120$

$x^2 + y^2 = 289$

$(x - y)^2 = x^2 + y^2 - 2xy$

$= 289 - 2 \times 120 = 289 - 240 = 49$

$\therefore x - y = 7$

37. (2) Let the numbers be x and *y*.

$\therefore x + y = 10$ and $xy = 24$

$\therefore \quad \frac{x+y}{xy} = \frac{1}{y} + \frac{1}{x} = \frac{10}{24} = \frac{5}{12}$

38. (4) Expression $= 99 + \frac{1}{7} + 99 + \frac{2}{7}$

$+ 99 + \frac{3}{7} + ... + 99 + \frac{6}{7}$

$= (99 \times 6) + \left(\frac{1}{7} + \frac{2}{7} + \frac{3}{7} + \frac{4}{7} + \frac{5}{7} + \frac{6}{7}\right)$

$= 594 + \left(\frac{1+2+3+4+5+6}{7}\right)$

$= 594 + \frac{21}{7} = 594 + 3 = 597$

39. (4) Let number of boys = *x*

and number of girls = 85 – *x*

According to the question,

$x \times 4 + (85 - x) \times 5 = 380$

$\Rightarrow 4x + 425 - 5x = 380$

$\Rightarrow x = 45$

40. (2) Let one of the positive numbers be x.
$\therefore$ The other will be 4x
Now, $4x \times x = 2500$
$\Rightarrow x^2 = 2500 \div 4 = 625$
$\therefore x = \sqrt{625} = 25$
$\therefore$ Sum of the two numbers
$= 5x = 5 \times 25 = 125$

41. (4) Let the ten's digit be x
$\therefore$ Unit's digit = x + 2
Therefore, the two digit number
$= 10x + x + 2$
$= 11x + 2$ ...(i)
Again,
$(11x + 2)(x + x + 2)$
$= 144$
$\Rightarrow (11x + 2)(2x + 2) = 144$
$(11x + 2)(x + 1) = 72$
$\Rightarrow 11x^2 + 2x + 11x + 2 = 72$
$\Rightarrow 11x^2 + 13x - 70 = 0$
$\Rightarrow 11x^2 - 22x + 35x - 70 = 0$
$\Rightarrow 11x(x - 2) + 35(x - 2) = 0$
$\Rightarrow (x - 2)(11x + 35) = 0$

$$\Rightarrow x = 2, -\frac{35}{11}$$

But $x = -\frac{35}{11}$ is not admissible.
$\therefore$ The number = 11x + 2
$= 11 \times 2 + 2 = 24$

42. (2) Let the number of correct answers be x
$\therefore$ The no. of incorrect answers
$= 20 - x$
According to the question,
$x - (20 - x) = 8$
$\Rightarrow x - 20 + x = 8$
$\Rightarrow 2x = 28 \Rightarrow x = 14$

43. (1) Let the number of boys = x
$\therefore$ Number of 25 paise coins= x^2
According to question,

$$\frac{25}{100} \times x^2 = 400$$

$$\Rightarrow \frac{x^2}{4} = 400 \Rightarrow x^2 = 1600$$

$$\Rightarrow x = \sqrt{1600} = 40$$

44. (2) Let the number be x.
According to the question,
$3 \times x^2 - 4 \times x = x + 50$
$\Rightarrow 3x^2 - 5x - 50 = 0$
$\Rightarrow 3x^2 - 15x + 10x - 50 = 0$
$\Rightarrow 3x(x - 5) + 10(x - 5) = 0$
$\Rightarrow (x - 5)(3x - 10) = 0$

$$\Rightarrow x = 5 \text{ or } \frac{-10}{3}$$

But the number is natural.

$$\therefore x \neq \frac{-10}{3}$$

Hence, the required number = 5.

45. (3) Let the number be x and y and $x > y$.
$x - y = 3$ ...(i)
$x^2 + y^2 = 369$ ...(ii)
From equation (i)
$x - y = 3$
$\Rightarrow (x - y)^2 = 3^2$
$\Rightarrow x^2 + y^2 - 2xy = 9$
$\Rightarrow 2xy = (x^2 + y^2) - 9$
$= 369 - 9 = 360$
From equation (ii)
Now, $(x + y)^2 = x^2 + y^2 + 2xy$
$= 369 + 360 = 729$

$$\therefore x + y = \sqrt{729} = 27$$

$\therefore$ Required sum = 27

46. (3) Let the unit's digit be x.
$\therefore$ Ten's digit = $x - 2$
$\therefore$ Number = $10(x - 2) + x$
$= 10x - 20 + x = 11x - 20$
New number obtained after reversing the digits
$= 10x + x - 2 = 11x - 2$
According to the question,

$$3(11x - 20) + \frac{6}{7}(11x - 2) = 108$$

$$\Rightarrow (11x - 20) + \frac{2}{7}(11x - 2) = 36$$

$\Rightarrow 77x - 140 + 22x - 4 = 252$
$\Rightarrow 99x = 252 + 144$

$$\Rightarrow x = \frac{396}{99} = 4$$

$\therefore$ Number = $11x - 20$
$= 11 \times 4 - 20 = 24$
$\therefore$ Sum of digits = 2 + 4 = 6

47. (3) Let the first number be x.
$\therefore$ Second number = $2x$,

and third number = $\frac{2x}{3}$

Now, $x + 2x + \frac{2x}{3} = 44 \times 3$

$$\Rightarrow \frac{3x + 6x + 2x}{3} = 132$$

$\Rightarrow 11x = 132 \times 3$

$$\Rightarrow x = \frac{132 \times 3}{11} = 36$$

$\therefore$ Required difference

$$= x - \frac{2x}{3} = \frac{x}{3} = \frac{36}{3} = 12$$

48. (2) Let the two digit number be $10y + x$.
According to the question,
$10y + x = 5(x + y)$
$\Rightarrow 10y + x - 5x - 5y = 0$
$\Rightarrow 5y - 4x = 0$ ....(i)
And,
$10y + x + 9 = 10x + y$
$\Rightarrow 9x - 9y = 9$
$\Rightarrow x - y = 1$ ... (ii)
From equation (i),
$\Rightarrow 5y - 4(1 + y) = 0$ [From (ii)]
$\Rightarrow 5y - 4 - 4y = 0$
$\Rightarrow y = 4$
$\therefore$ From equation (ii),
$x = 4 + 1 = 5$
$\therefore$ Number = $10 \times 4 + 5 = 45$
$\therefore$ Sum of digits = 4 + 5 = 9

49. (4) The number of multiples of 130 are obtained by dividing 1000 by 130. The quotient i.e. 7 gives the result.

50. (4) Zeros are obtained if there is any zero at the end of any multiplicand and if 5 or multiple of 5 are multiplied by any even number. i.e. $(5)^n (2)^m$ has n zeros if $n < m$ or m zeros if $m < n$
Now, we obtain the index of 5 as follows :

$$\text{Index} = \left[\frac{1000}{5}\right] + \left[\frac{1000}{5^2}\right] + \left[\frac{1000}{5^3}\right] + \left[\frac{1000}{5^4}\right]$$

$= 200 + 40 + 8 + 1 = 249.$
Certainly, n will be less than m.
$\therefore$ Number of zeros = 249

51. (1) Let the numbers be a and b, where $a > b$
According to the question,
$a - b = 3$ ...(i)
$a^2 - b^2 = 39$
$\Rightarrow (a + b)(a - b) = 39$

$$\Rightarrow a + b = \frac{39}{a - b} = \frac{39}{3} = 13$$

$\Rightarrow a + b = 13$ ...(ii)
Adding equations (i) and (ii)
$2a = 16 \Rightarrow a = 8$

52. (2) Check through options
$20 \rightarrow 20 + 7 = 27 \rightarrow 27 \times 5$
$= 135 \rightarrow 135 \div 9$
$= 15 \rightarrow 15 - 3 = 12$
OR, We will solve the problem from the opposite side.
Here the remainder is 12.
$12 + 3 = 15$
$15 \times 9 = 135$
$135 \div 5 = 27$
$27 - 7 = 20$
$\therefore$ The original number was 20.

53. (3) Let the smallest number be x.
$\therefore x \times 7 = 33333....$

$$\Rightarrow x = \frac{33333....}{7} = 47619$$

54. (2) Let the two digit number be = $10x + y$.
According to the question,
$10x + y = 3(x + y)$
$\Rightarrow 10x + y = 3x + 3y$
$\Rightarrow 10x + y - 3x - 3y = 0$
$\Rightarrow 7x - 2y = 0$ ...(i)
and,
$10x + y + 45 = 10y + x$
$\Rightarrow 10y + x - 10x - y = 45$
$\Rightarrow 9y - 9x = 45$
$\Rightarrow 9(y - x) = 45$
$\Rightarrow y - x = 5$ ...(ii)
$2 \times$ (ii) + (i) we have
$2y - 2x + 7x - 2y = 10$

$$\Rightarrow 5x = 10 \Rightarrow x = \frac{10}{5} = 2$$

From equation (ii),
$y - 2 = 5 \Rightarrow y = 2 + 5 = 7$
$\therefore$ Number = $10x + y$
$= 2 \times 10 + 7 = 27$
$\therefore$ Sum of digits = 2 + 7 = 9

55. (1) Let the remainder in each case be x.
Then, $(2272 - x)$ and $(875 - x)$ are exactly divisible by that three digit number.
Hence, their difference $[(2272 - x) - (875 - x)] = 1397$ will also be exactly divisible by the said divisor (N).
Now, $1397 = 11 \times 127$
Since both 11 and 127 are prime numbers, N is 127.
$\therefore$ Sum of digits = 1+ 2 + 7 = 10

56. (1) Let the numbers be x and y respectively.
$\therefore x + y = 12$ and $xy = 35$

$$\therefore \frac{1}{x} + \frac{1}{y} = \frac{x + y}{xy} = \frac{12}{35}$$

57. (3) Let the third number be x.
$\therefore$ Second number = $3x$

$$\text{First number} = \frac{3}{2}x$$

According to the question,

$$\frac{3x}{2} + 3x + x = 44 \times 3$$

$$\Rightarrow \frac{3x + 6x + 2x}{2} = 44 \times 3$$

$$\Rightarrow 11x = 88 \times 3$$

$$\Rightarrow x = \frac{88 \times 3}{11} = 24$$

$\therefore$ The largest number
$= 3x = 3 \times 24 = 72$

58. (3) Let the two digit number be $10x + y$ where $x > y$.
Here, $x + y = 10$ ...(i)
and, $10x + y - 10y - x = 18$
$\Rightarrow 9x - 9y = 18$
$\Rightarrow 9(x - y) = 18$
$\Rightarrow x - y = 2$ ...(ii)
Solving equations (i) and (ii),
$x = 6$ and $y = 4$
$\therefore$ Number = $10 \times 6 + 4 = 64$

59. (1) Let the positive integer be x.
$\therefore 2x^2 - 5x = 3$
$\Rightarrow 2x^2 - 5x - 3 = 0$
$\Rightarrow 2x^2 - 6x + x - 3 = 0$
$\Rightarrow 2x(x - 3) + 1(x - 3) = 0$
$\Rightarrow (x - 3)(2x + 1) = 0$

$\therefore x = 3$ and $x = -\frac{1}{2}$ is not admissible.

60. (2) Let the first number be x.
$\therefore$ Second number = $14 - x$
$\therefore x(14 - x) = 24(x - 14 + x)$
$\Rightarrow x(14 - x) = 24(2x - 14)$
$\Rightarrow 14x - x^2 = 48x - 336$
$\Rightarrow x^2 + 34x - 336 = 0$
$\Rightarrow x^2 + 42x - 8x - 336 = 0$
$\Rightarrow x(x + 42) - 8(x + 42) = 0$
$\Rightarrow (x + 42)(x - 8) = 0$
$\therefore x = 8$ as $x \neq -42$
$\therefore$ Second number = $14 - 8 = 6$
$\therefore$ Larger number = 8
Note : It is preferable to solve it by oral calculation with the help of given alternatives.

61. (4) If the first number be x, then

$$\text{Second number} = \frac{x}{5}$$

$$\therefore x \times \frac{x}{5} = 0.008$$
$\Rightarrow x^2 = 0.008 \times 5 = 0.04$
$\therefore x = \sqrt{0.04} = 0.2$
$\therefore$ Smaller number

$$= \frac{0.2}{5} = 0.04$$

62. (1) Let the natural numbers be x and y.
$\therefore$ Required sum = $18x + 21y$
$= 3(6x + 7y)$
Hence, the sum is divisible by 3.
$\therefore$ Required answer = 2007

63. (1) Let the numbers be x and y.
$\therefore x(x + y) = 247$
and $y(x + y) = 114$
$\Rightarrow x^2 + xy = 247$ and $xy + y^2 = 114$
On adding;
$x^2 + xy + xy + y^2 = 247 + 114$
$\Rightarrow x^2 + 2xy + y^2 = 361$
$\Rightarrow (x + y)^2 = 19^2 \Rightarrow x + y = 19$

64. (4) The sum of two odd numbers is even. The same is the case with their product.
$\therefore a + b + 2ab$ = Even number

65. (2) $d = 4375 + 2986 - 2361$
$= 5000$

66. (3) According to the question,

$$\left(\frac{n}{2} + \frac{n}{4} + \frac{n}{5}\right) + 7 = n$$

$$\Rightarrow \left(\frac{10n + 5n + 4n}{20}\right) + 7 = n$$

$$\Rightarrow \frac{19n}{20} + 7 = n$$

$$\Rightarrow n - \frac{19n}{20} = 7 \Rightarrow \frac{n}{20} = 7$$

$\Rightarrow n = 20 \times 7 = 140$

67. (2) If the number of correct answers be x, then
$x \times 4 - 1.(200 - x) = 200$
$\Rightarrow 4x - 200 + x = 200$
$\Rightarrow 5x = 400$

$$\Rightarrow x = \frac{400}{5} = 80$$

68. (2) Let the number of correct answers be x.
$\therefore x \times 4 - (75 - x) \times 1 = 125$
$\Rightarrow 4x - 75 + x = 125$
$\Rightarrow 5x = 125 + 75 = 200$

$$\therefore x = \frac{200}{5} = 40$$

69. (1) Let the numbers be a and b.
According to the question,
$ab = 120$ ... (i)
and $a^2 + b^2 = 289$ ... (ii)
$\therefore (a+b)^2 = a^2 + b^2 + 2ab$
$= 289 + 2 \times 120$
$= 289 + 240 = 529$
$\therefore a + b = \sqrt{529} = 23$

70. (4) Let the numbers be x and y.
According to the question,
$x + y = 11$ ....(i)
$xy = 18$ ...(ii)
Dividing equation (i) by equation (ii)

$$\frac{x+y}{xy} = \frac{1}{y} + \frac{1}{x} = \frac{11}{18}$$

71. (1) Let number of grapes eaten on the first day be x.
$\therefore x + x + 6 + x + 12 + x + 18 + x + 24 = 100$
$\Rightarrow 5x + 60 = 100$
$\Rightarrow 5x = 100 - 60 = 40$

$$\Rightarrow x = \frac{40}{5} = 8$$

72. (1) Let the original number be x.
According to the question
$7.2 \times x - 0.72 \times x = 2592$
$\Rightarrow x(7.2 - 0.72) = 2592$
$\Rightarrow x \times 6.48 = 2592$

$$\Rightarrow x = \frac{2592}{6.48}$$

$$= \frac{2592 \times 100}{648} = 400$$

73. (3) Let the numbers be x, y and z.
$\therefore x + y = 55$ ....(i)
$y + z = 65$ ....(ii)
$3x + z = 110$ ....(iii)
By equation (iii) – (ii),
$3x - y = 110 - 65 = 45$ ....(iv)
By equation (i) + (iv),
$4x = 45 + 55 = 100$
$\Rightarrow x = 25$
From equation (iii),
$75 + z = 110$
$\Rightarrow z = 110 - 75 = 35$

74. (3) Let unit's digit be x.
Ten's digit $= x + 5$
Number $= 10(x + 5) + x$
$= 11x + 50$
Again,
$11x + 50 - 5(2x + 5)$
$= 10x + x + 5$
$\Rightarrow 11x + 50 - 10x - 25 = 11x + 5$
$\Rightarrow 10x = 20 \Rightarrow x = 2$
$\therefore$ Required sum
$= 2x + 5 = 2 \times 2 + 5 = 9$

75. (2) Let the number be $100(2x) + 10y + x = 201x + 10y$ .....(i)
$\therefore 2x + y + x = 18$
$\Rightarrow 3x + y = 18$ .....(ii)
When the digits are reversed, number
$= 100(x) + 10y + 2x$
$= 102x + 10y$ .....(iii)
$\therefore 201x + 10y - 102x - 10y = 396$
$\Rightarrow 99x = 396 \Rightarrow x = 4$
$\therefore$ From equation (i)
$3 \times 4 + y = 18$
$\Rightarrow y = 18 - 12 = 6$
$\therefore$ Required difference $= 2x - y = 2 \times 4 - 6 = 2$

76. (1) Let the two digit number be $10y + x$ where $x > y$
$\therefore 10x + y - 10y - x = 63$
$\Rightarrow 9x - 9y = 63$
$\Rightarrow x - y = 7$
$\therefore x = 7, 8, 9$ and $y = 0, 1, 2$

77. (3) Let the required number be x.
$\therefore x^2 + x = 2 \times 3 \times 5$
$\Rightarrow x^2 + x - 30 = 0$
$\Rightarrow x^2 + 6x - 5x - 30 = 0$
$\Rightarrow x(x + 6) - 5(x + 6) = 0$
$\Rightarrow (x - 5)(x + 6) = 0$
$\Rightarrow x = 5$

78. (2) Number of hens $= x$
$\therefore$ Number of cows $= 48 - x$
$\therefore 2x + (48 - x) \times 4 = 35 \times 4$
$\Rightarrow 2x + 192 - 4x = 140$
$\Rightarrow 2x = 192 - 140 = 52$
$\Rightarrow x = 26$

79. (1) Length of the road = 1000 metre
Number of plants on one side of the road $= \frac{1000}{20} + 1 = 51$
$\therefore$ Total number of plants
$= 2 \times 51 = 102$

80. (1) $\left(999 + \frac{98}{99}\right) \times 99$
$= 999 \times 99 + 98$
$= (1000 - 1)\,99 + 98$
$= 99000 - 99 + 98 = 98999$

81. (4) If the number be $10x + y$ then number obtained by reversing the digits $= 10y + x$.
$\therefore 10x + y + 10y + x = 11(x + y)$
If $x + y = 11$ the possible pairs are = (2, 9), (3, 8), (4, 7) and (5, 6)
$\therefore$ Required answer = 8

82. (4) Expression
$= \left(99 + \frac{95}{99}\right) \times 99$
$= 99 \times 99 + 95$
$= 99(100 - 1) + 95$
$= 9900 - 99 + 95 = 9896$

83. (4) Marbles in the 50th box will be kept by 1st, 2nd, 5th, 10th, 25th and 50th persons.
[There are the factors of 50].
$\therefore$ Number of marbles
$= 1 + 2 + 5 + 10 + 25 + 50 = 93$

84. (2) Number of pants

$$= \frac{252}{2\frac{1}{2}} = \frac{252 \times 2}{5} = 100$$

Number of shirts

$$= \frac{141 \times 4}{7} \approx 80$$

85. (3) $323 = 17 \times 19$

86. (2) Let one of the positive number be x.
$\therefore$ The other will be 4x
Now, $4x \times x = 2500$
$\Rightarrow x^2 = 2500 \div 4 = 625$
$\therefore x = \sqrt{625} = 25$
$\therefore$ Sum of the two numbers
$4x + x = 5x = 5 \times 25 = 125$

87. (2) If the number of correct sums be x, then,
$x \times 3 - (30 - x) \times 2 = 40$
$\Rightarrow 3x - 60 + 2x = 40$
$\Rightarrow 5x = 60 + 40 = 100$
$\Rightarrow x = 20$

88. (4) $a * b = a + b + \frac{a}{b}$

$$\therefore 12 * 4 = 12 + 4 + \frac{12}{4}$$

$= 16 + 3 = 19$

89. (2) Number of trees on each side of the road
[+1 because we would start with a tree]

$$= \frac{1760}{20} + 1 = 88 + 1 = 89$$

$\therefore$ Required answer
$= 89 \times 2 = 178$

90. (2) A + B= 3 (B + C)
A + B + C = A + 30
B = 5 C
$\therefore$ A + B = 3 (B + C)
$\Rightarrow$ A + 5C = 18C $\Rightarrow$ A = 13C
$\therefore$ A + B + C = A + 30
13C + 5C + C = 13C + 30
$\Rightarrow$ 6C = 30
$\Rightarrow$ C = 5
$\Rightarrow$ A = 13 × 5 = ₹ 65

91. (3) If the numbers be x and y, then
$x + y = a$ and $xy = b$

$$\therefore \frac{1}{y}+\frac{1}{x}=\frac{x+y}{xy}=\frac{a}{b}$$

92. (4) $999\ \frac{999}{1000} \times 7$

$$= \left(999+\frac{999}{1000}\right)\times 7$$

$$= 6993+\frac{6993}{1000}$$

$$= 6993 + 6\ \frac{993}{1000}$$

$$= 6993 + 6 + \frac{993}{1000}$$

$$= 6999\ \frac{993}{1000}$$

93. (2) Total number of workers
= 125 × 9 = 1125

94. (1) Expression

$$= 999\frac{1}{7}+999\frac{2}{7}+\ldots+999\frac{6}{7}$$

$$= \left(999+\frac{1}{7}\right)+\left(999+\frac{2}{7}\right)+\ldots\ldots$$

$$+\left(999+\frac{6}{7}\right)$$

$$= (6\times 999)+\left(\frac{1}{7}+\frac{2}{7}+\frac{3}{7}+\ldots+\frac{6}{7}\right)$$

$$= 5994+\left(\frac{1+2+3+4+5+6}{7}\right)$$

$$= 5994 + \frac{21}{7} = 5994 + 3 = 5997$$

95. (1) 228 = 70 × 3 + 18

96. (3) Divisor = 5 × remainder
= 5 × 36 = 180
Again, Divisor = 12 × quotient
$\therefore$ 180 = 12 × quotient

$$\therefore \text{Quotient} = \frac{180}{12} = 15$$

$\therefore$ Dividend = Divisor × Quotient + Remainder
= 180 × 15 + 36
= 2700 + 36 = 2736

97. (1) If the numbers be x and y, then
$x + y = 8$ ..... (i)
$xy = 15$ ..... (ii)
Dividing equation (i) by (ii)

$$\frac{x+y}{xy}=\frac{8}{15} \Rightarrow \frac{x}{xy}+\frac{y}{xy}=\frac{8}{15}$$

$$\Rightarrow \frac{1}{y}+\frac{1}{x}=\frac{8}{15}$$

98. (3) Suppose number is x.
$\therefore$ 3 (2x + 9) = 75
$\Rightarrow$ 6x + 27 = 75
$\Rightarrow$ 6x = 48 $\Rightarrow$ x = 8

99. (3) $\because a * b = a + b - ab$
$\therefore$ 5 * 7 = 5 + 7 – 5 × 7 = 12 – 35
= – 23

100. (3) 12 months' salary
= ₹ 90 + turban
$\therefore$ 9 months' salary

$$= (₹\ 90 + \text{turban}) \times \frac{9}{12}$$

$$= ₹\ 90 \times \frac{3}{4} + \frac{3}{4}\ \text{turban}$$

$$= ₹\ \frac{135}{2} + \frac{3}{4}\ \text{turban}$$

$$\therefore ₹\ \frac{135}{2} + \frac{3}{4}\ \text{turban}$$

= ₹ 65 + turban

$$\therefore \frac{1}{4}\ \text{turban} = \frac{135}{2} - 65 = ₹\ \frac{5}{2}$$

$$\therefore \text{Turban} \Rightarrow \frac{5}{2}\times 4 = ₹\ 10$$

101. (3) Let the number be $10x + y$.
Dividend = Divisor × quotient + remainder
$\therefore$ $10x + y = 6(x + y) + 3$
$\Rightarrow$ $10x + y = 6x + 6y + 3$
$\Rightarrow$ $10x - 6x + y - 6y = 3$
$\Rightarrow$ $4x - 5y = 3$ ....(i)
Again, $10y + x = 4 (x + y) + 9$
$\Rightarrow$ $10y + x = 4x + 4y + 9$
$\Rightarrow$ $6y - 3x = 9$
$\Rightarrow$ $2y - x = 3$ ....(ii)
$\therefore$ By equation (i) + 4 × (ii),
$4x - 5y = 3$
$8y - 4x = 12$
$3y = 15$
$\Rightarrow$ $y = 5$
From equation (ii),
$2 \times 5 - x = 3 \Rightarrow$
$x = 10 - 3 = 7$
$\therefore$ Sum of digits = $x + y = 7 + 5 = 12$

102. (3) Every rational number is a real number.

103. (4) 0.01 < 0.015 < 0.12
$\Rightarrow$ – 0.01 > – 0.015 > – 0.12
$\Rightarrow p < r < q$

104. (2) A + B = 120
B + C = 130
C + A = 140
On adding,
2 (A + B + C) = 120 + 130 + 140 = 390

$$\Rightarrow \text{A + B + C} = \frac{390}{2} = 195$$

$\therefore$ Marks obtained by C = Marks obtained by (A + B + C) – Marks obtained by (A + B)
= 195 – 120 = 75

105. (1) Required answer

$$= \frac{1}{7\times 24} = \frac{1}{168} = 0.0059$$

106. (3) $x = 0.\dot{3} + 0.\dot{6} + 0.\dot{7} + 0.\dot{8}$

$$= \frac{3}{9}+\frac{6}{9}+\frac{7}{9}+\frac{8}{9}$$

$$= \frac{3+6+7+8}{9} = \frac{24}{9} = \frac{8}{3} = 2\frac{2}{3}$$

107. (2) Let the number of oranges with Natu be x.
Number of oranges with Buchku = y
Case I,
$x + 10 = 2 (y - 10)$
$\Rightarrow$ $x + 10 = 2y - 20$
$\Rightarrow$ $2y - x = 20 + 10 = 30$ ..(i)
Case II,
$y + 10 = x - 10$
$\Rightarrow$ $x - y = 10 + 10 = 20$ ... (ii)
On adding equations (i) and (ii),
$2y - x + x - y = 30 + 20$
$\Rightarrow$ $y = 50$
From equation (ii),
$x - 50 = 20$
$\Rightarrow$ $x = 50 + 20 = 70$