1. (a) As 1x71y 61 is exactly divisible by 11.
$(1 + 7 + y + 1) - (x + 1 + 6) = 0$ or multiple of 13 for minimum difference
$9 + y - 7 - x = 0$
$\Rightarrow x - y = 2$

2. (b) Four integers next lower than 81 is 80,79,78,77 four integers next higher than 81 is 82,83,84,85
Sum=$(80 + 82)+(79 + 83)+(78 + 84)+$
$(77+ 85)$
$= 81+81+81+81 = 4 \times 81$
Sum is divisible by 9 as 81 is divisible by 9.

3. (a) putting n = 1, we get $2 + \sqrt{3}$ = whose integral part is3 putting n=2,we get$(2 + \sqrt{3})^2 = 4 + 3 + 4\sqrt{3}$
whose integral part is 11
which is again an odd number
Now, through the options it can be judged that the greatest integer must always be an odd number.

4. (c) LCM of3 and 5 = 15
Number divisible by 15 are 15,30, 45 ....300.
Let total numbers are n
$300 = 15 + (n - 1) \times 15$
$300 = 15 + 15n - 15$
$\Rightarrow n = 20$

5. (b) 7! +8!+9! + 10! +....+100 = 7.6! + 8.7.6!+9.8.7.6! +........ + 100! is completely divisible by 7 as each of the terms contain at least one 7 in it.
Now, 1!+2! +3!+4! +5! +6!
= 1+2+6+24+120+720 = 873
which leaves a remainder of 5 when divided by 7.

6. (b) Number divisible by 13,26,39,.... 494
Let n be the total numbers $494 = 13 + (n - 1) \times 13$
$\Rightarrow n = 38$

7. (b) Divisor = [Sum of remainders]-[Remainder when sum is divided]
$= 11 + 21 - 4 - 28$

8. (d) Let number be N.
Then, $N = \text{Divisor} \times Q_1 + 23$
$2N = \text{Divisor} \times Q_2 + 11$,
where Q_1 and Q_2 are quotients respectively.
Here, we have two equations and 3 variables. There equations cannot be solved.

9. (d) Let the number be $5q + 3$, where q is quotient
Now, $(5q + 3)^2 = 25q^2 + 30q + 9$
$= 25q^2 + 30q + 5 + 4$
$= 5[5q^2 + 6q + 1] + 4$
Hence, reminder is 4.

10. (b) $3 \div \left[(8-5) \div \left\{(4-2) \div \left(2 + \frac{8}{13}\right)\right\}\right]$

$$\Rightarrow 3 \div \left[(3) \div \left(2 \div \frac{34}{13}\right)\right]$$

$$\Rightarrow 3 \div \left[(3) \div \left(2 \times \frac{13}{34}\right)\right]$$

$$\Rightarrow 3 \div \left[\frac{3 \times 34}{13 \times 2}\right]$$

$$\Rightarrow \frac{3 \times 13 \times 2}{3 \times 34} = \frac{13}{17}$$

11. (a)$\because$ $56 = d_1 \times d_2$

$\therefore$ required remainder = $d_1 r_2 + r_1$ where $d_1 = 7$ and $r_1 = 3$ and $r_2 = 5$.

i.e. $7 \times 5 + 3 = 38$

12. (b) He wants to write from l to 999. He has to write 9 numbers of one digit, 90 numbers of two digits and 900 numbers of three digits.

Total number of times = $1 \times 9 + 2 \times 90 + 3 \times 900 = 2889$

13. (a) $\therefore$Complete remainder = $d_1 d_2 r_3 + d_1 r_2 + r_1$

$= 3 \times 5 \times 4 + 3 \times 2 + 1 = 67$

Divided 67 by 8,5 and 3, the remainders are 3,3,1.

14. (a) Sum of the digits of the 'super' number

$= 1+2+3+......+29$

$= \frac{29}{2}.\{2 \times 1 + (29-1).1\}$

$= \frac{29}{2}.(2+28) = \frac{29 \times 30}{2} = 29 \times 15 = 435$

435 when divided by 9 leave remainder 3.

15. (a) x989y is divisible by 44 it means divisible by 4 and 11 both.

$\because$x959y is divisible by 4.9y is divisible by 4. Therefore y = 6 (given y >5)

Now x9596 is divisible by 11

$(x+5+6)-(9+9) = 0$

$(11+x) - 18 = 0$

$x = 7, y = 6$

16. (d) $\frac{\left(\frac{1}{2}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}\right)}{\left(\frac{2}{5}-\frac{5}{9}+\frac{3}{5}-\frac{7}{18}\right)} = \frac{\left(\frac{30-15+12-10}{60}\right)}{\left(\frac{2}{5}+\frac{3}{5}\right)-\left(\frac{5}{9}+\frac{7}{18}\right)} = \frac{\left(\frac{17}{60}\right)}{1-\frac{17}{18}}$

$$= \left(\frac{17}{60} \times 18\right) = \frac{51}{10} = 5\frac{1}{10}$$

17. (c) By actual division, we find that 999999 is exactly divisible by 13. The quotient 76923 is the required number.

18. (d) Complete remainder= $d_1 d_2 r_3 + d_1 r_2 + r_1$

$= 5 \times 6 \times 7 + 5 \times 4 + 3 = 233$.

Dividing 233, by reversing the divisors i.e. by 8,6,5; respective remainders are 1,5,4.

19. (a) Let the number be z. Now $385 = 5 \times 7 \times 11$

5	Z	Remainders
7	Y	4
11	X	6
	102	10

$x = 11 \times 102 + 10 = 1132$

$y = 7x + 6 = 7 \times 1132 + 6 = 7930$

$z = 5y + 4 = 5 \times 7930 + 4 = 39654$

20. (b) Required Divisor = (sum of remainders)

- Remainder when sum is divided

$= [4375 + 2986] - 2361 = 5000$