NUMBER SYSTEM

Expt. No. Class 1.

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Date 15/02/2015

AIM :

Q:1 CHOOSE YOUR BASE B/W 3 AND 13. AND WRITE FIRST 50 NUMBERS.

→

⇒ Let's take Base as 9

0	10	20	30	40	50	60
1	11	21	31	41	51	61
2	12	22	32	42	52	62
3	13	23	33	43	53	63
4	14	24	34	44	54	64
5	15	25	35	45	55	65
6	16	26	36	46	56	66
7	17	27	37	47	57	67
8	18	28	38	48	58	68

Q:2:→ ADD AND SUBSTRACT SINGLE AND MULTIPLE DIGIT IN YOUR NUMBER SYSTEM.

⇒ ADDITION.

$$\begin{array}{r} 3 \\ +5 \\ \hline 8 \end{array} \qquad \begin{array}{r} 6 \\ +4 \\ \hline 11 \end{array} \qquad \begin{array}{r} 1 \\ +0 \\ \hline 1 \end{array} \qquad \begin{array}{r} 3 \\ +8 \\ \hline 12 \end{array} \qquad \begin{array}{r} 7 \\ +9 \\ \hline 17 \end{array}$$

$24 \rightarrow 2\times9 + 4\times9) = 22_{10}$

$31 \rightarrow 3\times9 + 1\times9 = 28_{10}$

$55_9 \qquad 50_{10}$

$9\overline{)50}$ (5, 45, 5)

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```
  33
+ 99
-----
 153
```

$33 \Rightarrow 3\times9 + 3\times9^0$

$= 27 + 3$

$= 30_{10}$

$99 \Rightarrow 9\times11$

$= 99_{10}$

$30 + 99 = 129_{10}$

```
      14
   ---------
9 | 129
    9
   ----
    39
    36
   ----
     3
```

```
      1
   ---------
9 |  14
     9
   ----
     5
```

```
9 |  1   => 1
```

$33 + 99 = 153$

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66
+48
125

66 ⇒ 6×9¹ + 6×9⁰
= 54 + 6
= 60

48 ⇒ 4×9¹ + 8×9⁰
= 36 + 8
= 44

60 + 44 = 104

Convert to base 9

9 | 104 — 11
9
14
9
(5)

9 | 11 — 1
9
(2)

9 | 1 = 1 ∴ 125

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SUBTRACTION

$$\begin{array}{r} 5 \\ -3 \\ \hline 2 \end{array} \qquad \begin{array}{r} 3 \\ -1 \\ \hline 2 \end{array} \qquad \begin{array}{r} 9 \\ -5 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 33 \\ -21 \\ \hline 12 \end{array} \qquad \begin{array}{r} 98 \\ -97 \\ \hline 01 \end{array} \qquad \begin{array}{r} {}^{2}\not{8}{}^{1}3 \\ -25 \\ \hline 08 \end{array}$$

Q3:- PREPARE A TABLE OF SINGLE DIGIT MULTIPLICATION IN YOUR NUMBER SYSTEM

	0	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8
2	0	2	4	6	8	11	13	15	17
3	0	3	6	10	13	16	20	23	26
4	0	4	8	12	17	22	26	31	35
5	0	5	11	16	22	27	33	38	44
6	0	6	13	20	26	33	40	46	53
7	0	7	15	23	31	38	46	54	62
8	0	8	17	26	35	44	53	62	71

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Q:4 MULTIPLY MULTIPLE DIGIT IN YOUR NUMBER SYSTEM

$$\begin{array}{r} 8 \\ \times 8 \\ \hline 71 \end{array} \qquad \begin{array}{r} 23 \\ \times 25 \\ \hline 586 \end{array}$$

$23 \Rightarrow 2 \times 9_{10} + 3$

$\Rightarrow 18 + 3$

$\Rightarrow 21$

$25 \Rightarrow 2 \times 9_{10} + 5$

$= 18 + 5$

$= 23$

$23 \times 21 \Rightarrow 483_{10}$

convert to base 9

$$\begin{array}{r|l} & 53 \\ 9 & 483 \\ & 45 \\ \hline & 33 \\ & 27 \\ \hline & (6) \end{array}$$

$$\begin{array}{r|l} & 5 \\ 9 & 53 \\ & 45 \\ \hline & (8) \end{array}$$

$$\begin{array}{r|l} & 586_9 \end{array}$$

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AIM :

Q:5 WRITE 1, 10, 20, 30, 50 AND 100 FROM YOUR BASE TO BASE 10

1 → 1

10 → 9

20 → 18

30 → 27

50 → 45

100 → 81

Q-6 WRITE A STRETGY TO CONVERT Base 7 to Base 10 in PLAIN Englisn OR Psudo CODE OR CODE

=> STEP 1: TAKE NUMBER.

STEP 2: DIVIDE THAT NUMBER BY 10. TO GET WHOLE NUMBER. AND GET THE REMINDER ADDED

e.g. 21

=> $2 \times 7_{10} + 1_{10}$

=> 14 + 1

=> 15

STEP 3:- MULTIPLY BY 7 WHOLE NUMBER AND ADD REMINDER IN IT.

Example : 154_7

$15 \times 7_{10} + 4$

=> $2 \times 7_{10} + 1 + 4$

=> 15

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AIM: EXAMPLE : 154

$154 = (1 \times 7^2) + (5 \times 7^1) + (4 \times 7^0)$

$= 49 + 35 + 4$

$= 88$

$1324 = (1 \times 7^3) + (3 \times 7^2) + (2 \times 7^1) + (4 \times 7^0)$

$= 1 \times 7 \times 7 \times 7 + 3 \times 7 \times 7 + 2 \times 7 + 4$

$= 343 + 147 + 14 + 4$

$= 508$

CODE:

FUNCTION / METHOD TO CONVERT BASE 7 TO BASE 10 (JAVA)

```
Public Int ConvertToBaseTeN (String Number){
    Int baseTenNum = 0;
int lengthOfNumber = number.length();

for(i=0; i<length; i++) {

    Char digitChar = number.charAT (length-1-i);
    Int digit = Character.getNumericValue
                                (digitchar)
    baseTenNum += digit * Math.Pow (7, i)

} return baseTenNum; }
```

Call this method in your class and pass Number as String to get the o/p

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Q:7 Write a strategy to convert Base N to Base M

=> Convert BaseN to Base10 first and then Base10 to BaseM so that calculation will be easy.

Here, First will take four loop for converting base N to base10 same like above question which was base 7 to 10

```
int baseN = 7, baseM = 8
    for( i=0; i<length; i++) {

        Char digitChar = number.charAt(length-1, -i)
        int digit = Character.getNumericValue
                                (digitChar);
        baseTenNum = digit * Math.pow(baseN, i)
```

=> Here baseTenNum is now base10 Number.

↳ Iterate it through while loop for baseM

```
StringBuilder S = new StringBuilder
    While (baseTenNum > 0)
    {
        int r = baseTenNum % baseM;

        S.insert(0, Integer.toString(r, baseM));

        baseTenNum /= baseM;
    }
    return S.toString()
}
```

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Q:8 In base 10 How many 5 digit Numbers will come

$9 \times 10 \times 10 \times 10 \times 10$

$= 90,000$

Q:9 Algorithm or Strategy to find $\log_{10}$

Use brutforce algorithms.

```
While ( Math.Pow(10, value) < provided value)
{
    Value = Value + 0.00001 (or more
                              smaller no.)
}
```