

## Loop related problems (total 20 questions)

SL	Problem statement	Difficulty levels														
1.	<p>Write a program (WAP) that will print following series upto N<sup>th</sup> terms.</p> <p style="text-align: center;">1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, .....</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>2</td><td>1, 2</td></tr><tr><td>5</td><td>1, 2, 3, 4, 5</td></tr><tr><td>11</td><td>1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11</td></tr></table>	Sample input	Sample output	2	1, 2	5	1, 2, 3, 4, 5	11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	*						
Sample input	Sample output															
2	1, 2															
5	1, 2, 3, 4, 5															
11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11															
2.	<p>Write a program (WAP) that will print following series upto N<sup>th</sup> terms.</p> <p style="text-align: center;">1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31 .....</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>2</td><td>1, 3</td></tr><tr><td>5</td><td>1, 3, 5, 7, 9</td></tr><tr><td>11</td><td>1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21</td></tr></table>	Sample input	Sample output	2	1, 3	5	1, 3, 5, 7, 9	11	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21	*						
Sample input	Sample output															
2	1, 3															
5	1, 3, 5, 7, 9															
11	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21															
3.	<p>Write a program (WAP) that will print following series upto N<sup>th</sup> terms.</p> <p style="text-align: center;">1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, .....</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>1, 0</td></tr><tr><td>3</td><td>1, 0, 1</td></tr><tr><td>4</td><td>1, 0, 1, 0</td></tr><tr><td>7</td><td>1, 0, 1, 0, 1, 0, 1</td></tr><tr><td>13</td><td>1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1</td></tr></table>	Sample input	Sample output	1	1	2	1, 0	3	1, 0, 1	4	1, 0, 1, 0	7	1, 0, 1, 0, 1, 0, 1	13	1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1	**
Sample input	Sample output															
1	1															
2	1, 0															
3	1, 0, 1															
4	1, 0, 1, 0															
7	1, 0, 1, 0, 1, 0, 1															
13	1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1															
4.	<p>Write a program (WAP) that will take <b>N</b> numbers as inputs and compute their average.</p> <p>(Restriction: Without using any array)</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>3 10      20      30.5</td><td>AVG of 3 inputs: 20.166667</td></tr><tr><td>2 22.4    11.1</td><td>AVG of 2 inputs: 16.750000</td></tr></table>	Sample input	Sample output	3 10      20      30.5	AVG of 3 inputs: 20.166667	2 22.4    11.1	AVG of 2 inputs: 16.750000	*								
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3 10      20      30.5	AVG of 3 inputs: 20.166667															
2 22.4    11.1	AVG of 2 inputs: 16.750000															

5.	<p>Write a program (WAP) that will take two numbers <b>X</b> and <b>Y</b> as inputs. Then it will print the square of <b>X</b> and increment (if <b>X&lt;Y</b>) or decrement (if <b>X&gt;Y</b>) <b>X</b> by 1, until <b>X</b> reaches <b>Y</b>. If and when <b>X</b> is equal to <b>Y</b>, the program prints “Reached!”</p> <table><tr><th><i>Sample input(X,Y)</i></th><th><i>Sample output</i></th></tr><tr><td>10    5</td><td>100, 81, 64, 49, 36, Reached!</td></tr><tr><td>5     10</td><td>25, 36, 49, 64, 81, Reached!</td></tr><tr><td>10    10</td><td>Reached!</td></tr></table>	<i>Sample input(X,Y)</i>	<i>Sample output</i>	10    5	100, 81, 64, 49, 36, Reached!	5     10	25, 36, 49, 64, 81, Reached!	10    10	Reached!	*
<i>Sample input(X,Y)</i>	<i>Sample output</i>									
10    5	100, 81, 64, 49, 36, Reached!									
5     10	25, 36, 49, 64, 81, Reached!									
10    10	Reached!									
6.	<p>Write a program (WAP) for the described scenario: Player-1 picks a number <b>X</b> and Player-2 has to guess that number within <b>N</b> tries. For each wrong guess by Player-2, the program prints “Wrong, <b>N-1</b> Choice(s) Left!” If Player-2 at any time successfully guesses the number, the program prints “Right, Player-2 wins!” and <u>terminates right away</u>. Otherwise after the completion of <b>N</b> wrong tries, the program prints “Player-1 wins!” and halts.</p> <p>(Hint: Use break/continue)</p> <table><tr><th><i>Sample input (X,N,n1, n2,...,nN)</i></th><th><i>Sample output</i></th></tr><tr><td>5 3 12   8   5</td><td>Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Right, Player-2 wins!</td></tr><tr><td>100 5 50   100</td><td>Wrong, 4 Choice(s) Left! Right, Player-2 wins!</td></tr><tr><td>20 3 12   8   5</td><td>Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Wrong, 0 Choice(s) Left! Player-1 wins!</td></tr></table>	<i>Sample input (X,N,n1, n2,...,nN)</i>	<i>Sample output</i>	5 3 12   8   5	Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Right, Player-2 wins!	100 5 50   100	Wrong, 4 Choice(s) Left! Right, Player-2 wins!	20 3 12   8   5	Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Wrong, 0 Choice(s) Left! Player-1 wins!	**
<i>Sample input (X,N,n1, n2,...,nN)</i>	<i>Sample output</i>									
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20 3 12   8   5	Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Wrong, 0 Choice(s) Left! Player-1 wins!									
7.	<p>Write a program (WAP) that will run and show keyboard inputs until the user types an ‘A’ at the keyboard.</p> <table><tr><th><i>Sample input</i></th><th><i>Sample output</i></th></tr><tr><td>X 1 a A</td><td>Input 1: X Input 2: 1 Input 3: a</td></tr></table>	<i>Sample input</i>	<i>Sample output</i>	X 1 a A	Input 1: X Input 2: 1 Input 3: a	*				
<i>Sample input</i>	<i>Sample output</i>									
X 1 a A	Input 1: X Input 2: 1 Input 3: a									

8.	<p>Write a program (WAP) that will reverse the digits of an input integer.</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>13579</td><td>97531</td></tr><tr><td>4321</td><td>1234</td></tr></table>	Sample input	Sample output	13579	97531	4321	1234	**																																																
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13579	97531																																																							
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9.	<p>Write a program (WAP) that will find the grade of <b>N</b> students. For each student, it will take the marks of his/her attendance (on 5 marks), assignment (on 10 marks), class test (on 15 marks), midterm (on 50 marks), term final (on 100 marks). Then based on the tables shown below, the program will output his grade.</p> <table><tr><td>Attendance (A)</td><td>5%</td></tr><tr><td>Assignments (HW)</td><td>10%</td></tr><tr><td>Class Tests (CT)</td><td>15%</td></tr><tr><td>Midterm (MT)</td><td>30%</td></tr><tr><td>Final (TF)</td><td>40%</td></tr></table> <table><tr><td>Marks</td><td>Letter Grade</td><td>Marks</td><td>Letter Grade</td><td>Marks</td><td>Letter Grade</td></tr><tr><td>90-100</td><td>A</td><td>70-73</td><td>C+</td><td>Less than 55</td><td>F</td></tr><tr><td>86-89</td><td>A-</td><td>66-69</td><td>C</td><td></td><td></td></tr><tr><td>82-85</td><td>B+</td><td>62-65</td><td>C-</td><td></td><td></td></tr><tr><td>78-81</td><td>B</td><td>58-61</td><td>D+</td><td></td><td></td></tr><tr><td>74-77</td><td>B-</td><td>55-57</td><td>D</td><td></td><td></td></tr></table> <table><tr><th>Sample input (A,HW,CT,MT,TF)</th><th>Sample output</th></tr><tr><td>2</td><td>Student 1 : A</td></tr><tr><td>5    10    15    44.5    92.5</td><td>Student 2 : F</td></tr><tr><td>0    7.5    5    20    55.5</td><td></td></tr></table>	Attendance (A)	5%	Assignments (HW)	10%	Class Tests (CT)	15%	Midterm (MT)	30%	Final (TF)	40%	Marks	Letter Grade	Marks	Letter Grade	Marks	Letter Grade	90-100	A	70-73	C+	Less than 55	F	86-89	A-	66-69	C			82-85	B+	62-65	C-			78-81	B	58-61	D+			74-77	B-	55-57	D			Sample input (A,HW,CT,MT,TF)	Sample output	2	Student 1 : A	5    10    15    44.5    92.5	Student 2 : F	0    7.5    5    20    55.5		*
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10.	<p>Write a program (WAP) that will give the sum of first <math>N^{\text{th}}</math> terms for the following series.</p> <p>1, -2, 3, -4, 5, -6, 7, -8, 9, -10, 11, -12, 13, -14, .....</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>2</td><td>Result: -1</td></tr><tr><td>3</td><td>Result: 2</td></tr><tr><td>4</td><td>Result: -2</td></tr></table>	Sample input	Sample output	2	Result: -1	3	Result: 2	4	Result: -2	**																																														
Sample input	Sample output																																																							
2	Result: -1																																																							
3	Result: 2																																																							
4	Result: -2																																																							

11.	<p>Write a program (WAP) that will calculate the result for the first N<sup>th</sup> terms of the following series. [In that series sum, dot sign (.) means multiplication]</p> <p><math>1^2.2 + 2^2.3 + 3^2.4 + 4^2.5 + \dots</math></p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>2</td><td>Result: 14</td></tr><tr><td>3</td><td>Result: 50</td></tr><tr><td>4</td><td>Result: 130</td></tr><tr><td>7</td><td>Result: 924</td></tr></table>	Sample input	Sample output	2	Result: 14	3	Result: 50	4	Result: 130	7	Result: 924	**
Sample input	Sample output											
2	Result: 14											
3	Result: 50											
4	Result: 130											
7	Result: 924											
12.	<p>Write a program (WAP) that will print Fibonacci series upto N<sup>th</sup> terms.</p> <p>1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, .....</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>1, 1</td></tr><tr><td>4</td><td>1, 1, 2, 3</td></tr><tr><td>7</td><td>1, 1, 2, 3, 5, 8, 13</td></tr></table>	Sample input	Sample output	1	1	2	1, 1	4	1, 1, 2, 3	7	1, 1, 2, 3, 5, 8, 13	**
Sample input	Sample output											
1	1											
2	1, 1											
4	1, 1, 2, 3											
7	1, 1, 2, 3, 5, 8, 13											
13.	<p>Write a program (WAP) that will print the factorial (<b>N!</b>) of a given number <b>N</b>. Please see the sample input output.</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>1! = 1 = 1</td></tr><tr><td>2</td><td>2! = 2 X 1 = 2</td></tr><tr><td>3</td><td>3! = 3 X 2 X 1 = 6</td></tr><tr><td>4</td><td>4! = 4 X 3 X 2 X 1 = 24</td></tr></table>	Sample input	Sample output	1	1! = 1 = 1	2	2! = 2 X 1 = 2	3	3! = 3 X 2 X 1 = 6	4	4! = 4 X 3 X 2 X 1 = 24	**
Sample input	Sample output											
1	1! = 1 = 1											
2	2! = 2 X 1 = 2											
3	3! = 3 X 2 X 1 = 6											
4	4! = 4 X 3 X 2 X 1 = 24											
14.	<p>Write a program (WAP) that will find <sup>n</sup>C<sub>r</sub> where <b>n</b> &gt;= <b>r</b>; <b>n</b> and <b>r</b> are integers.</p> <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>5 2</td><td>10</td></tr><tr><td>10 3</td><td>120</td></tr><tr><td>7 7</td><td>1</td></tr><tr><td>6 1</td><td>6</td></tr></table>	Sample input	Sample output	5 2	10	10 3	120	7 7	1	6 1	6	**
Sample input	Sample output											
5 2	10											
10 3	120											
7 7	1											
6 1	6											

15.	Write a program (WAP) that will find $x^y$ (x to the power y) where x, y are positive integers.	*												
<table><tr><th>Sample input(x,y)</th><th>Sample output</th></tr><tr><td>5 2</td><td>25</td></tr><tr><td>2 0</td><td>1</td></tr><tr><td>6 1</td><td>6</td></tr><tr><td>0 5</td><td>0</td></tr></table>			Sample input(x,y)	Sample output	5 2	25	2 0	1	6 1	6	0 5	0		
Sample input(x,y)	Sample output													
5 2	25													
2 0	1													
6 1	6													
0 5	0													
16.	WAP that will find the GCD (greatest common divisor) and LCM (least common multiple) of two positive integers.	**												
<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>5 7</td><td>GCD: 1 LCM: 35</td></tr><tr><td>12 12</td><td>GCD: 12 LCM: 12</td></tr><tr><td>12 32</td><td>GCD: 4 LCM: 96</td></tr></table>			Sample input	Sample output	5 7	GCD: 1 LCM: 35	12 12	GCD: 12 LCM: 12	12 32	GCD: 4 LCM: 96				
Sample input	Sample output													
5 7	GCD: 1 LCM: 35													
12 12	GCD: 12 LCM: 12													
12 32	GCD: 4 LCM: 96													
17.	WAP that will determine whether a number is prime or not.	**												
<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>Not prime</td></tr><tr><td>2</td><td>Prime</td></tr><tr><td>11</td><td>Prime</td></tr><tr><td>39</td><td>Not prime</td></tr><tr><td>101</td><td>Prime</td></tr></table>			Sample input	Sample output	1	Not prime	2	Prime	11	Prime	39	Not prime	101	Prime
Sample input	Sample output													
1	Not prime													
2	Prime													
11	Prime													
39	Not prime													
101	Prime													
18.	WAP that will determine whether an integer is a palindrome number or not.	**												
<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>9</td><td>Yes</td></tr><tr><td>91</td><td>No</td></tr><tr><td>222</td><td>Yes</td></tr><tr><td>12321</td><td>Yes</td></tr><tr><td>110</td><td>No</td></tr></table>			Sample input	Sample output	9	Yes	91	No	222	Yes	12321	Yes	110	No
Sample input	Sample output													
9	Yes													
91	No													
222	Yes													
12321	Yes													
110	No													

19.	<p>WAP that will calculate the following mathematical function for the input of x. Use only the series to solve the problem.</p> $\text{Sin}x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \dots \dots \infty$ <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>0.841</td></tr><tr><td>2</td><td>0.909</td></tr><tr><td>3</td><td>0.141</td></tr></table>	Sample input	Sample output	1	0.841	2	0.909	3	0.141	***		
Sample input	Sample output											
1	0.841											
2	0.909											
3	0.141											
20.	<p>Write a program that takes an integer number n as input and find out the sum of the following series up to n terms.</p> $1 + 12 + 123 + 1234 + \dots$ <table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>13</td></tr><tr><td>3</td><td>136</td></tr><tr><td>4</td><td>1370</td></tr></table>	Sample input	Sample output	1	1	2	13	3	136	4	1370	**
Sample input	Sample output											
1	1											
2	13											
3	136											
4	1370											