INSERTION SORT

Algorithm:--

```
for(i=1;i<n;i++)
k=a[i];
j=i-1;
while(j \ge 0 && a[i] > key)
   a[j+1]=a[j];
   j=j+1;
a[j+1]=key;
```

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Value 2.7 7.4 0.5 1.1 1.1 0.3 6.2 4.4 3.1 7.7	Array index	0	1	2	3	4	5	6	7	8	9
	Value	2.7	7.4	0.5	1.1	1.1	0.3	6.2	4.4	3.1	7.7

Array index	0	1	2	3	4	5	6	7	8	9
Value	2.7	7.4	0.5	1.1	1.1	0.3	6.2	4.4	3.1	7.7
value	8	2	6	2	7	2	1	2	4	1

Iteration 0: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	2.7	7.4	0.5	1.1	1.1	0.3	6.2	4.4	3.1	7.7
value	8	2	6	2	7	2	1	2	4	1

Iteration 1: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	2.7	0.5	7.4	1.1	1.1	0.3	6.2	4.4	3.1	7.7
	0		1		/				4	

Iteration 2: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	2.7	7.4	1.1	1.1	0.3	6.2	4.4	3.1	7.7
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Iteration 2: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	2.7	7.4	1.1	1.1	0.3	6.2	4.4	3.1	7.7
value	6	8	2	2	7	2	1	2	4	1

Iteration 2: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	2.7	1.1	7.4	1.1	0.3	6.2	4.4	3.1	7.7
	6	8							4	Τ.

Iteration 3: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	2.7	7.4	1.1	0.3	6.2	4.4	3.1	7.7
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Iteration 3: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	2.7	7.4	1.1	0.3	6.2	4.4	3.1	7.7
value	6	2	8	2	7	2	1	2	4	1

Iteration 3: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	2.7	1.1	7.4	0.3	6.2	4.4	3.1	7.7
value	6	2	8	7	2	2	1	2	4	1
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Iteration 4: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	1.1	2.7	7.4	0.3	6.2	4.4	3.1	7.7
value	6	2	7	8	2	2	1	2	4	1
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Iteration 4: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	1.1	2.7	7.4	0.3	6.2	4.4	3.1	7.7
value	6	2	7	8	2	2	1	2	4	1

Iteration 4: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	1.1	2.7	0.3	7.4	6.2	4.4	3.1	7.7
					1	•				

Iteration 5: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	1.1	0.3	2.7	7.4	6.2	4.4	3.1	7.7
value	6	2	7	2	8	2	1	2	4	1
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Iteration 5: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	1.1	0.3	1.1	2.7	7.4	6.2	4.4	3.1	7.7
	6	<u> </u>	2	A	8	<u> </u>		- 2	4	Т

Iteration 5: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.5	0.3	1.1	1.1	2.7	7.4	6.2	4.4	3.1	7.7
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Iteration 5: step 3.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	7.4	6.2	4.4	3.1	7.7
	*									

Iteration 5: step 4.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	7.4	6.2	4.4	3.1	7.7
value	2	6	2	7	8	2	1	2	4	1

Iteration 5: step 5.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	6.2	7.4	4.4	3.1	7.7
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Iteration 6: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	6.2	7.4	4.4	3.1	7.7
value	2	6	2	7	8	1	2	2	4	1

Iteration 6: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	6.2	4.4	7.4	3.1	7.7
							1	•		

Iteration 7: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	4.4	6.2	7.4	3.1	7.7 1
						1	**			

Iteration 7: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	4.4	6.2	7.4	3.1	7.7
value	2	6	2	7	8	2	1	2	4	1

Iteration 7: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1 7	2.7	4.4	6.2	3.1	7.4	7.7
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Iteration 8: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	4.4	3.1	6.2 1	7.4	7.7
							1	**		

Iteration 8: step 1.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1 7	2.7	3.1 4	4.4	6.2	7.4	7.7
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Iteration 8: step 2.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value.	0.3	0.5	1.1	1.1	2.7	3.1	4.4	6.2	7.4	7.7
value	2	6	2	7	8	4	2	1	2	1

Iteration 8: step 3.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Array index	0	1	2	3	4	5	6	7	8	9
Value	0.3	0.5	1.1	1.1	2.7	3.1	4.4	6.2	7.4	7.7
varue	2	6	2	7	8	4	2	1	2	1

Iteration 9: step 0.

Iteration i. Repeatedly swap element i with the one to its left if smaller.

Property. After ith iteration, a[0] through a[i] contain first i+1 elements in ascending order.

Value 0.3 0.5 1.1 1.1 2.7 3.1 4.4 6.2 7.4	Array index	U	1	2	3	4	ט	6	/	8	9
	Value	0.3	0.5	1.1	1.1	2.7	3.1	4.4	6.2	7.4	7.7

Iteration 10: DONE.