

Array Test Memory Work – Speeds & sorting

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| 1. Speed of swap | $O(1)$ |
| 2. Speed of find length of array | $O(1)$ |
| 3. Speed of max | $O(n)$ |
| 4. Speed of print | $O(n)$ |
| 5. Speed of min | $O(n)$ |
| 6. Speed of average | $O(n)$ |
| 7. Speed of search | $O(n)$ |
| 8. Speed of bin sort | $O(n)$ |
| 9. Speed of selection sort | $O(n^2)$ |
| 10. Speed of bubble sort – best case | Close to $O(n)$ |
| 11. Speed of bubble sort – average case | $O(n^2)$ |
| 12. Speed of bogosort | $O(n!)$ |
| 13. In Big-Oh notation, the O stands for... | Order |
| 14. In Big-Oh notation, the n stands for.. | Array size |
| 15. Why don't we measure algorithm speed in terms of seconds or time? | Time is hardware dependent. |
| 16. Which is faster: bubblesort (average) or selection sort? | Selection Sort |
| 17. Put the 3 sorts in order, fastest to slowest | Bin sort Bubble (best case), Selection, Bubble (average case) |
| 18. Why is selection sort called selection sort? | SELECTING best element (max) |
| 19. Why is bubblesort called bubblesort? | The billions of little swaps are like BUBBLES rising in pop. |
| 20. Why is bin sort called bin sort? | It makes BINS to count amount of each element |
| 21. Term for putting elements in order | Sorting |
| 22. Good hardware cannot compensate for | A bad algorithm |

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| 23. Term for a series of steps that complete a task | Algorithm |
| 24. Three tests to determine if something is an algorithm. | 1. series of steps 2. for a (one) task 3 completes the task |
| 25. Is all computer code an algorithm? | Yes |
| 26. Are all flowcharts an algorithm? | Yes |
| 27. Which sorting algorithm is not “in-place”? | binsort |
| 28. What does “in-place” algorithm mean? | It uses swaps. It doesn't need extra memory. |
| 29. What is the slowest sorting algorithm? | Bogosort |
| 30. Who wrote that good hardware cannot compensate for a slow algorithm? | Jon Bentley |
| 31. What is the first test to determine which sorting algorithm to use? | Repeated integers that fall in a small range. Use bin. |
| 32. What is the second test to determine which sorting algorithm to use? | Almost sorted. Use Bubble. |
| 33. Put the sorting speeds in order, fastest to slowest | $O(1)$, $O(\log n)$, $O(n)$, $O(n \log n)$, $O(n^2)$, $O(n^3)$, $O(n^4)$, $O(n!)$ |
| 34. What is a compromise when you must give up one thing to gain another? | A trade-off. |
| 35. Does one best sorting algorithm exist? | No. You must make trade-offs when selecting which to use. |
| 36. Positive of integers for picture names | Easy to type (no "" or .equals or .compareTo) |
| 37. Negative of integers for picture names | Not meaningful. |
| 38. Positive of Bubble sort | If almost sorted, close to $O(n)$. That's fast |
| 39. Negative of Bubble sort | In all other cases, slow $O(n^2)$. A lot of swaps. |

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| 40. Positive of Selection sort | Easy to understand. Based on max. |
| 41. Negative of Selection sort | Slow. Simplicity isn't efficient. |
| 42. Positive of Bin sort | Fast. Really fast. $O(n)$ |
| 43. Negative of Bin sort | Speed comes from very narrow situation: repeated ints, in a small range. |
| 44. What is the name for the address of the array elements? | index |
| 45. What is the plural of index? | indices |
| 46. The length of the array is 10. What are the indices? | 0-9 |
| 47. The indices of an array are 0-5. What is the length? | 6 |
| 48. What is the name for the data located at each index? | element |
| 49. What is the name for a set of variables all grouped under one name? | array |
| 50. 3 Reasons arrays are useful. | <ol style="list-style-type: none"> 1. Loop through them to reduce lines of code 2. Sorting 3. Searching |
| 51. 3 Reasons sorting is useful | <ol style="list-style-type: none"> 1. Searching is easier 2. Finding min, max is easier 3. Finding duplicates is easier |
| 52. How do you convert from a 1D array to a 2D array? | Add a set of [] |
| 53. How many steps to swap two elements? | 3 steps |
| 54. What is an array index out of bounds error? | Calling a place off the end of the array |

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| 55. If you are in [x][y], what is the co-ordinates for one spot above you? | [x-1][y] |
| 56. If you are in [x][y], what is the co-ordinates for one spot below you? | [x+1][y] |
| 57. If you are in [x][y], what is the co-ordinates for one spot to the left? | [x][y-1] |
| 58. If you are in [x][y], what is the co-ordinates for one spot to the right? | [x][y+1] |
| 59. Which way is the row? | Horizontal (i) |
| 60. Which way is the column? | Vertical (j) |
| 61. Which way is x or i? | Horizontal (Row) |
| 62. Which way is y or j? | Vertical (Column) |
| 63. What is the edge guard for x-1? | $x-1 < 0$ |
| 64. What is the edge guard for x+1? | $x+1 \geq \text{row}$ |
| 65. What is the edge guard for y-1? | $y-1 < 0$ |
| 66. What is the edge guard for y+1? | $y+1 \geq \text{col}$ |
| 67. What are the steps to move a maze character? | <ol style="list-style-type: none"> 1. Check if new spot is OK 2. Erase old spot 3. Adjust x, y co-ordinates 4. Draw in new spot |
| 68. How many loops do you need for a 1D coding question? | 1 |
| 69. How many loops do you need for a 2D coding question? | 2 |
| 70. What is the loop that occurs frequently in 1D algorithms? | <code>for(int i=0; i<a.length, i++)</code> |
| 71. What is the outer for loop for a 2D coding question? | <code>for(int i=0; i<row; i++)</code> |
| 72. What is the inner for loop for a 2D coding question? | <code>for(int j=0; j<col; j++)</code> |