

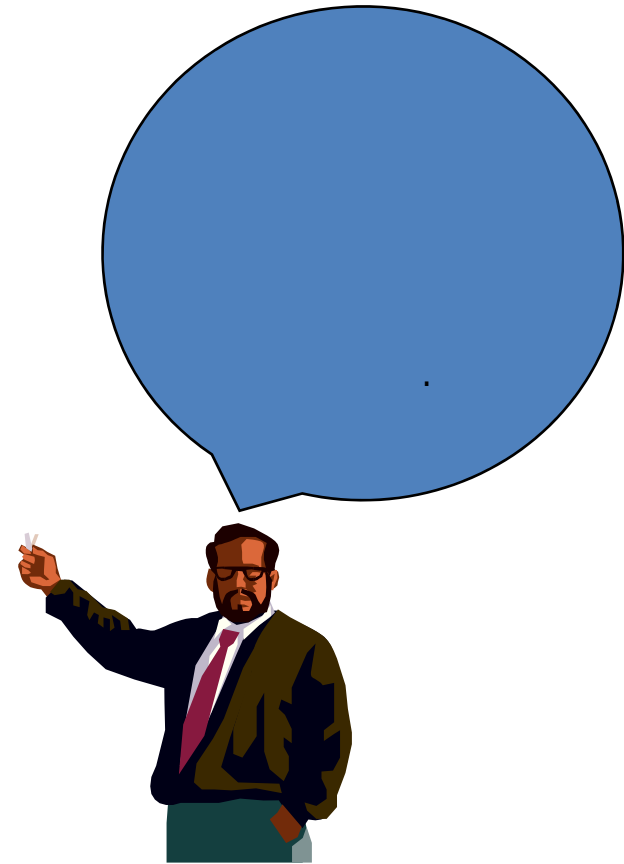
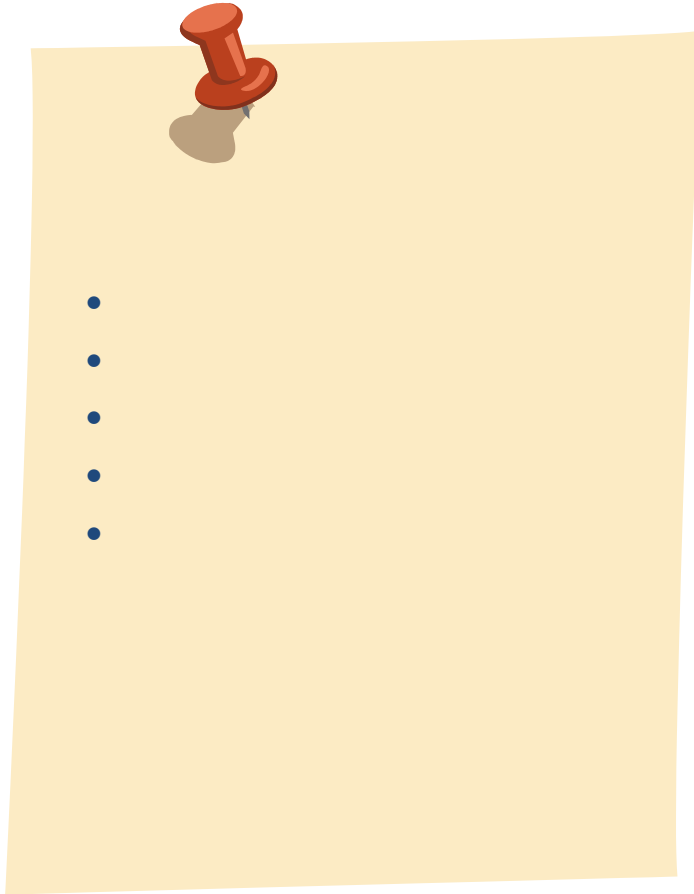
2008 Spring

Computer Engineering Programming 1

Lesson 9

- 10

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10

가

개별 변수를 사용하는 방법은 학생 수가 많아지면 번거로워집니다..



방법 #1: 개별 변수 사용

```
int s0;  
int s1;  
...  
int s9;
```

방법 #2: 배열 사용

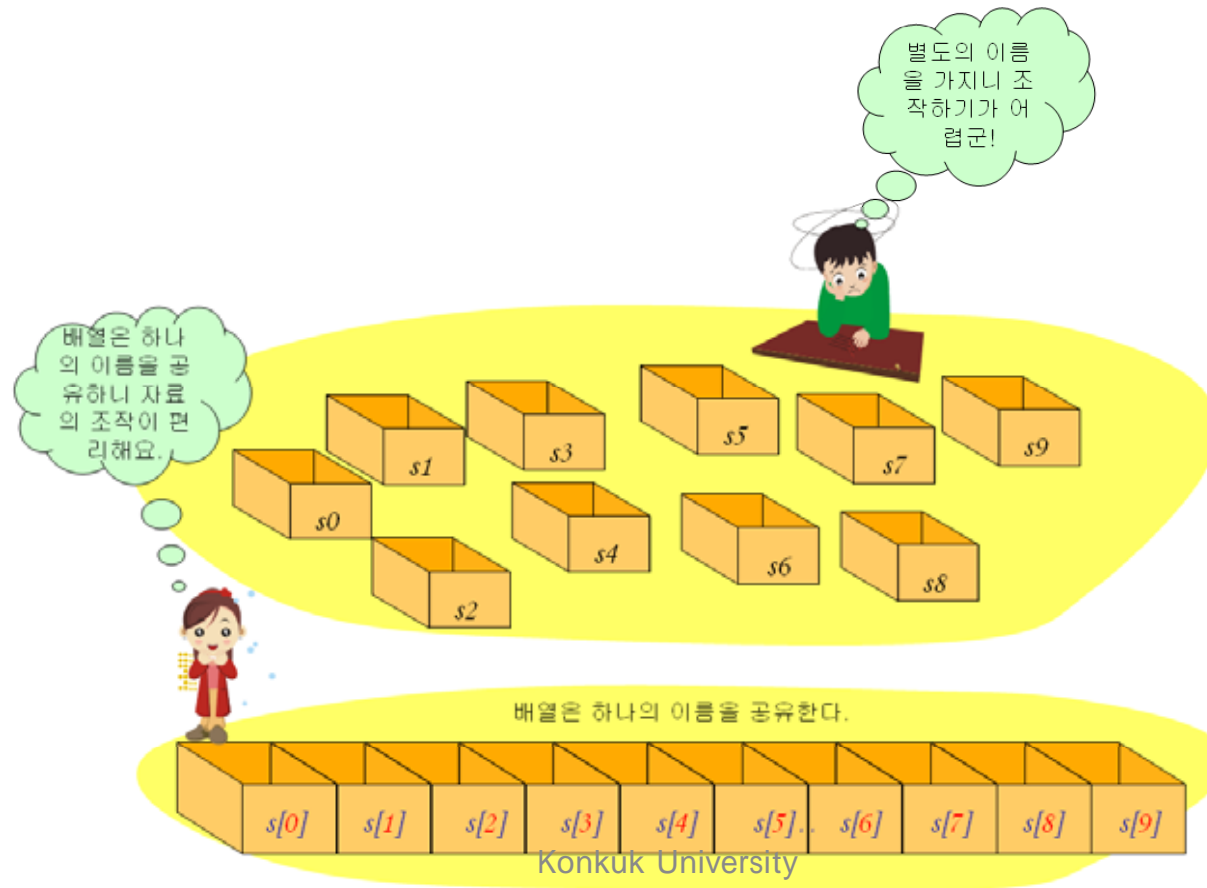
```
int s[10];
```

?

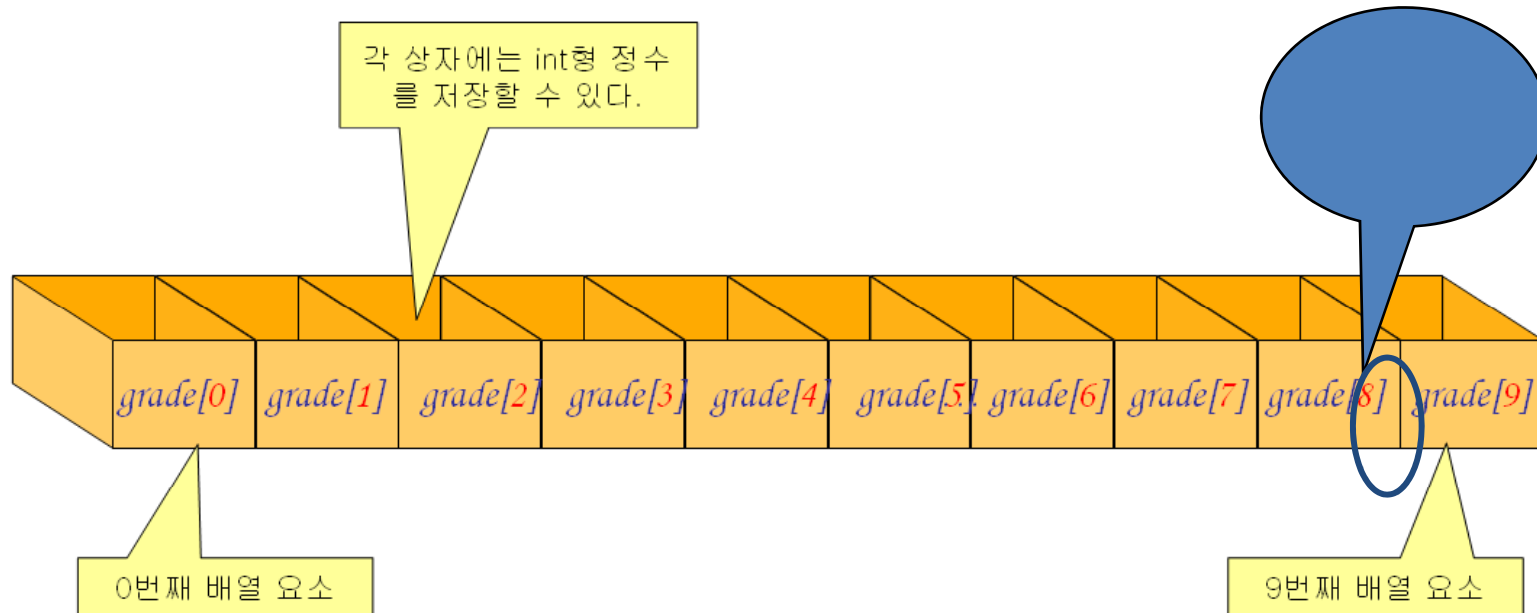
- (array):

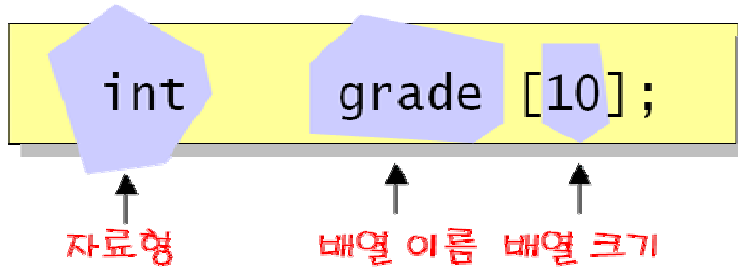
가

()



- *(index):*



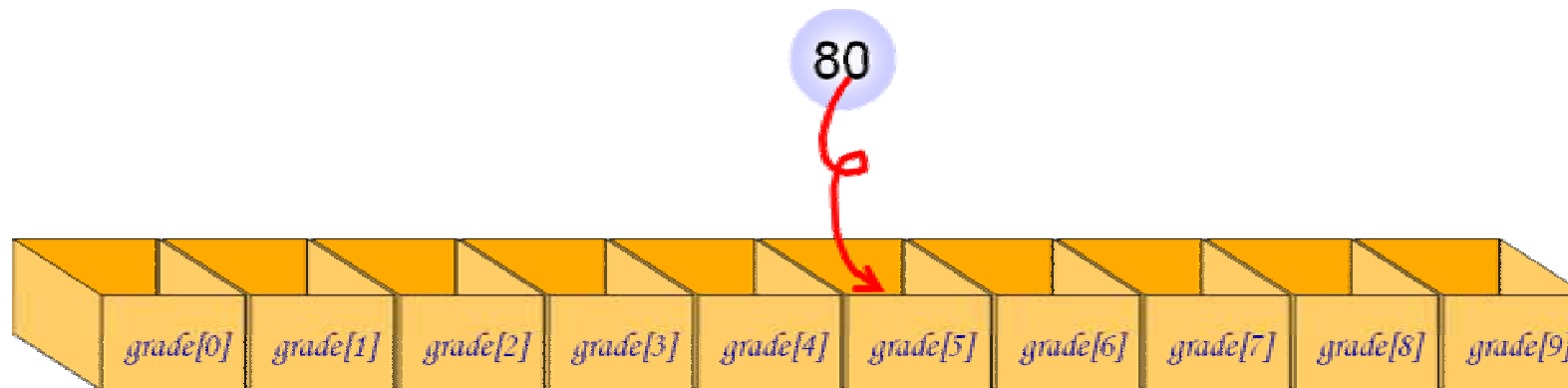


- : int
- : grade
- : 가 10
- () 0 .

```

int score[60];           // 60   int       가       grade
float cost[12];         // 12   float     가       cost
char name[50];         // 50   char     가       name
char src[10], dst[10]; // 2
int index, days[7];    //

```



`grade[5] = 80`

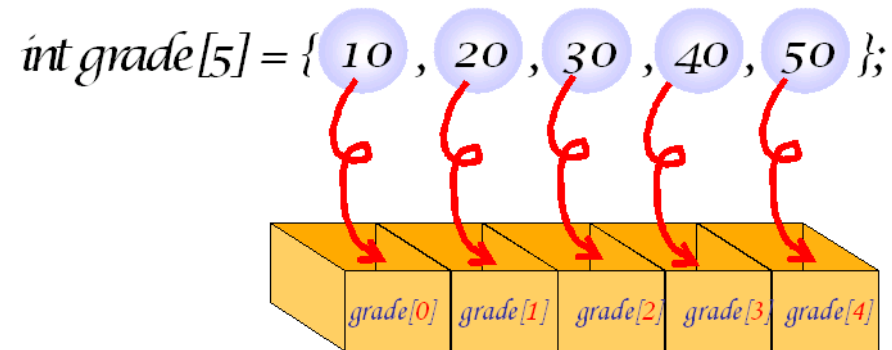
첨지 ()

```

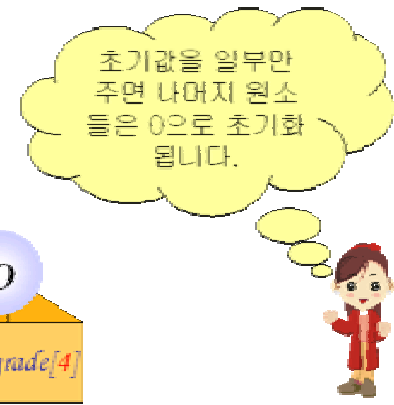
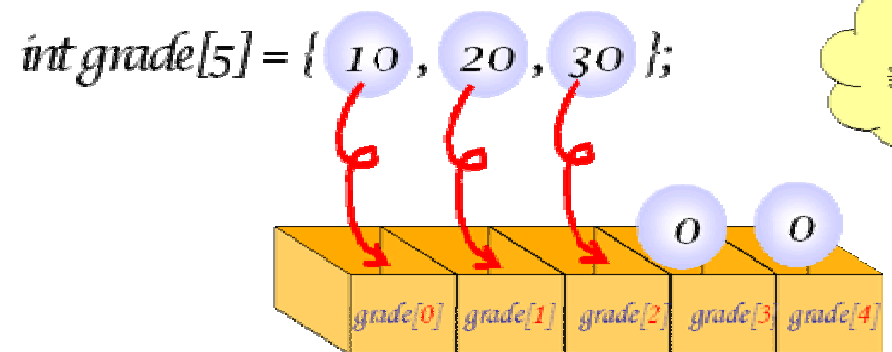
grade[5] = 80;
grade[1] = grade[0];
grade[i] = 100;    // i
grade[i+2] = 100;  // 가 .
grade[index[3]] = 100; // index[]

```

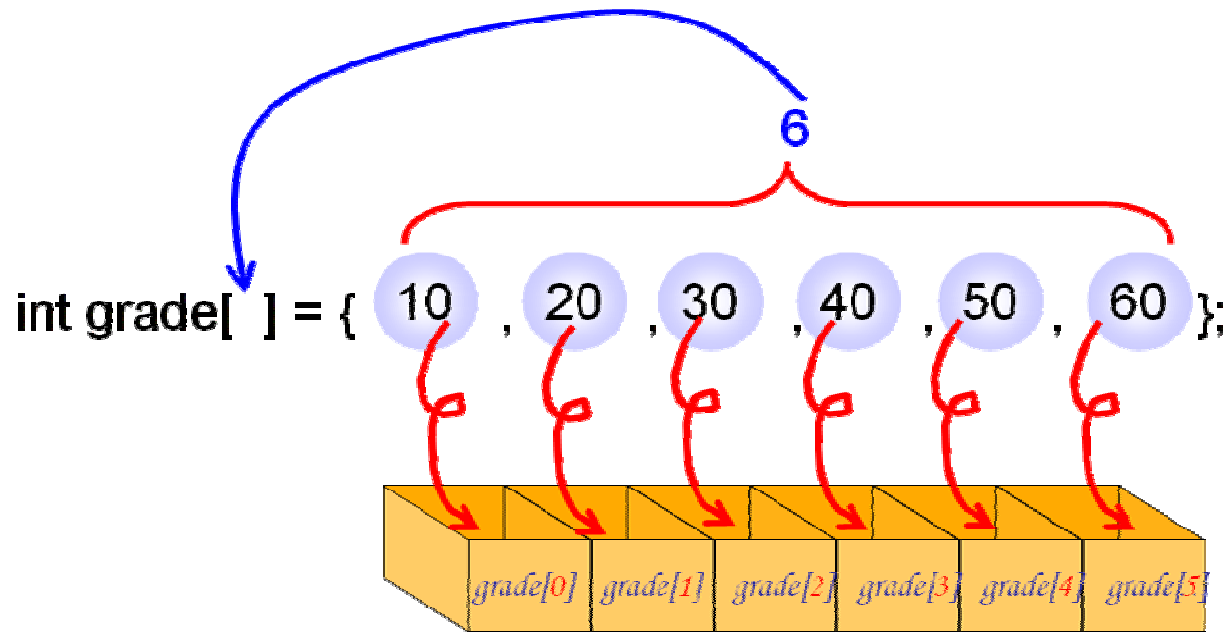
- `int grade[5] = { 10,20,30,40,50 };`



- `int grade[5] = { 10,20,30 };`



- 가





```
#include <stdio.h>
int main(void)
{
    int grade[10];
    int i;

    for(i = 0; i < 10; i++)
        grade[i] = 0;

    printf("=====\n");
    printf("          \n");
    printf("=====\n");

    for(i = 0; i < 10; i++)
        printf("%5d  %5d\n", i, grade[i]);

    return 0;
}
```



```
=====  
=====  
0    0  
1    0  
2    0  
3    0  
4    0  
5    0  
6    0  
7    0  
8    0  
9    0
```



```
#include <stdio.h>
int main(void)
{
    int grade[10] = { 31, 63, 62, 87, 14, 25, 92, 70, 75, 53 };
    int i;

    printf("=====\n");
    printf("          \n");
    printf("=====\n");

    for(i = 0; i < 10; i++)
        printf("%5d  %5d\n", i, grade[i]);

    return 0;
}
```



```
=====  
=====  
0    31  
1    63  
2    62  
3    87  
4    14  
5    25  
6    92  
7    70  
8    75  
9    53
```



```
#include <stdio.h>
#include <stdlib.h>
#define SIZE 10

int main(void)
{
    int grade[SIZE];
    int i;

    for(i = 0; i < SIZE; i++)
        grade[i] = rand() % 100;

    printf("=====\n");
    printf("          \n");
    printf("=====\n");

    for(i = 0; i < SIZE; i++)
        printf("%5d  %5d\n", i, grade[i]);
    return 0;
}
```



```
=====
인덱스   값
=====
  0      41
  1      67
  2      34
  3       0
  4      69
  5      24
  6      78
  7      58
  8      62
  9      64
```



```
#include <stdio.h>

#define STUDENTS 5

int main(void)
{
    int grade[STUDENTS];
    int sum = 0;
    int i, average;

    for(i = 0; i < STUDENTS; i++)
    {
        printf("Enter grade for student %d: ");
        scanf("%d", &grade[i]);
    }

    for(i = 0; i < STUDENTS; i++)
        sum += grade[i];

    average = sum / STUDENTS;
    printf("Average grade = %d\n", average);
    return 0;
}
```



```
: 10
: 20
: 30
: 40
: 50

= 30
```



```
#include <stdio.h>
#define SIZE 5

int main(void)
{
    int array[SIZE] = {1, 2, 3, 4, 5};
    int i;

    for(i = 0; i <= SIZE; i++)
        printf("array[%d] %d\n", i, array[i]);

    return 0;
}
```



```
array[0]    1
array[1]    2
array[2]    3
array[3]    4
array[4]    5
array[5]    1245120
```

```
int grade[SI ZE];  
int score[SI ZE];
```

```
score = grade;           //           !
```



```
#include <stdio.h>  
#define SI ZE 5
```

```
int main(void)  
{  
    int i;  
    int a[SI ZE] = {1, 2, 3, 4, 5};  
    int b[SI ZE];
```

```
    for(i = 0; i < SI ZE; i++)  
        b[i] = a[i];
```

```
    return 0;
```

```
}
```

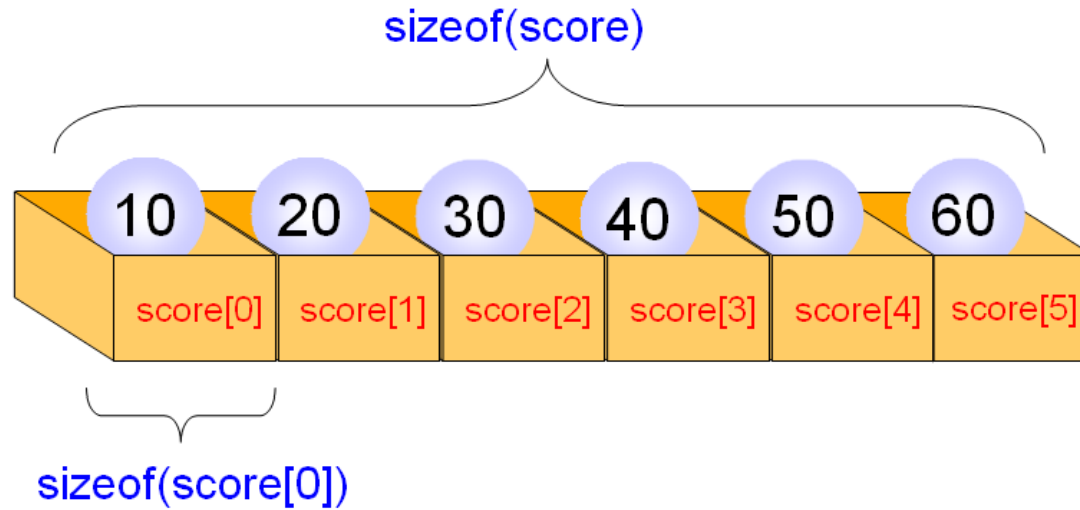


```
#include <stdio.h>
#define SIZE 5

int main(void)
{
    int i;
    int a[SIZE] = { 1, 2, 3, 4, 5 };
    int b[SIZE] = { 1, 2, 3, 4, 5 };

    if( a == b )           //
        printf("          .\n");
    else
        printf("          .\n");

    for(i = 0; i < SIZE ; i++) //
    {
        if ( a[i] != b[i] )
        {
            printf("a[]  b[]          .\n");
            return 0;
        }
    }
    printf("a[]  b[]          .\n");
    return 0;
}
```

```
int grade[] = { 1, 2, 3, 4, 5, 6 };
```

```
int i, size;
```

```
size = sizeof(grade) / sizeof(grade[0]);
```

```
for(i = 0; i < size ; i++)
```

```
    printf("%d ", grade[i]);
```



```
#include <stdio.h>
#define SIZE 5

int main(void)
{
    int data[SIZE];
    int i;

    for(i = 0; i < SIZE; i++)    //
    {
        printf("      :");
        scanf("%d", &data[i]);
    }

    for(i = SIZE - 1; i >= 0; i--)    //
    {
        printf("%d\n", data[i]);
    }
    return 0;
}
```



```
      :10
      :20
      :30
      :40
      :50
50
40
30
20
10
```



```
#include <stdio.h>
#define STUDENTS 5

int main(void)
{
    int grade[STUDENTS] = { 30, 20, 10, 40, 50 };
    int i, s;

    for(i = 0; i < STUDENTS; i++)
    {
        printf("    %d: ", i);
        for(s = 0; s < grade[i]; s++)
            printf("*");
        printf("\n");
    }

    return 0;
}
```



```
0: *****
1: *****
2: *****
3: *****
4: *****
```



```
#include <stdio.h>
#define SIZE 10

int main(void)
{
    int grade[SIZE];
    int i, min;

    for(i = 0; i < SIZE; i++)
    {
        printf("          : ");
        scanf("%d", &grade[i]);
    }

    min = grade[0];

    for(i = 1; i < SIZE; i++)
    {
        if( grade[i] < min )
            min = grade[i];
    }

    printf("          %d          .\n", min);
    return 0;
}
```



```
          : 50
          : 40
          : 30
          : 20
          : 10
          : 20
          : 30
          : 40
          : 60
          : 70
10          .
```



```
#include <stdio.h>
#define SIZE 101

int main(void)
{
    int freq[SIZE];
    int i, score;

    for(i = 0; i < SIZE; i++)
        freq[i] = 0;

    while(1)
    {
        printf("      (-1): ");
        scanf("%d", &score);
        if (score < 0) break;
        freq[score]++;
    }

    printf("      \n");

    for(i = 0; i < SIZE; i++)
        printf("%3d   %3d \n", i, freq[i]);

    return 0;
}
```



```
( -1): 0
( -1): 1
( -1): 99
( -1): 100
( -1): 100
( -1): -1

0    1
1    1
2    0
...
98   0
99   1
100  2
```



```
#include <stdio.h>
#include <stdlib.h>

#define SIZE 6

int main(void)
{
    int freq[SIZE] = { 0 };           // 0
    int i;

    for(i = 0; i < 10000; i++)       // 10000
        ++freq[ rand() % 6 ];       // 가

    printf("=====\n");
    printf("      \n");
    printf("=====\n");

    for(i = 0; i < SIZE; i++)
        printf("%3d  %3d \n", i, freq[i]);

    return 0;
}
```



```
=====  
=====  
0  1657  
1  1679  
2  1656  
3  1694  
4  1652  
5  1662
```



```
#include <stdio.h>
#define STUDENTS 5
int get_average(int score[], int n); //

int main(void)
{
    int grade[STUDENTS] = { 1, 2, 3, 4, 5 };
    int avg;
    avg = get_average(grade, STUDENTS);
    printf("    %d    .\n", avg);
    return 0;
}

int get_average(int score[], int n) //
{
    int i;
    int sum = 0;

    for(i = 0; i < n; i++)
        sum += score[i];
    return sum / n;
}
```

score[]

1/2



```
#include <stdio.h>
#define SIZE 7

void square_array(int a[], int size);
void print_array(int a[], int size);
void square_element(int e);

int main(void)
{
    int list[SIZE] = { 1, 2, 3, 4, 5, 6, 7 };

    print_array(list, SIZE);
    square_array(list, SIZE); //
    print_array(list, SIZE);

    printf("%3d\n", list[6]);
    square_element(list[6]); //
    printf("%3d\n", list[6]);

    return 0;
}
```


2/2



```
void square_array(int a[], int size)
{
    int i;

    for(i = 0; i < size; i++)
        a[i] = a[i] * a[i];
}
void square_element(int e)
{
    e = e * e;
}
void print_array(int a[], int size)
{
    int i;

    for(i = 0; i < size; i++)
        printf("%3d ", a[i]);
    printf("\n");
}
```



```
1 2 3 4 5 6 7
1 4 9 16 25 36 49
7
7
```



```
#include <stdio.h>
#define SIZE 20

void copy_array(char dest[], const char src[], int count);

int main(void)
{
    char s[SIZE] = { 'H', 'E', 'L', 'L', 'O', '\0' };
    char d[SIZE];

    copy_array(d, s, SIZE);
    printf("%s\n", d);
    return 0;
}

void copy_array(char dest[], const char src[], int size)
{
    int i;
    for(i = 0; i < size; i++)
    {
        dest[i] = src[i];
    }
}
```



?

가

()



비교	제조사	모델명	요약설명	최저가	업체수	출시
<input type="checkbox"/>	ROLLEI	D-41com	410만화소(0.56")/1.8"LCD/3배줌/연사/CF카드	320,000	4	02년
<input type="checkbox"/>	카시오	QV-R40	413만화소(0.56")/1.6"LCD/3배줌/동영상/히스토그램/앨범기능/SD,MMC카드	344,000	73	03년
<input type="checkbox"/>	파나소닉	DMC-LC43	423만화소(0.4")/1.5"LCD/3배줌/동영상+녹음/연사/SD,MMC카드	348,000	36	03년
<input type="checkbox"/>	현대	DC-4311	400만화소(0.56")/1.6"LCD/3배줌/동영상/SD,MMC카드	350,000	7	03년
<input type="checkbox"/>	삼성테크윈	Digimax420	410만화소(0.56")/1.5"LCD/3배줌/동영상+녹음/음성메모/한글/SD카드	353,000	17	03년
<input type="checkbox"/>	니콘	Coolpix4300	413만화소(0.56")/1.5"LCD/3배줌/동영상/연사/CF카드*hot4	356,800	79	02년
<input type="checkbox"/>	올림푸스	뮤-20 Digital	423만화소(0.4")/1.5"LCD/3배줌/동영상/연사/생활방수/xD카드	359,000	53	03년
<input type="checkbox"/>	코닥	LS-443(Dock포함)	420만화소/1.8"LCD/3배줌/동영상+녹음/SD,MMC카드/Dock시스템	365,000	39	02년
<input type="checkbox"/>	올림푸스	C-450Z	423만화소(0.4")/1.8"LCD/3배줌/동영상/연사/xD카드	366,000	38	03년
<input type="checkbox"/>	올림푸스	X-1	430만화소/1.5"LCD/3배줌/동영상/연사/xD카드	367,000	19	03년
<input type="checkbox"/>	미놀타	DIMAGE-F100	413만화소(0.56")/1.5"LCD/3배줌/동영상+녹음/음성메모/동체추적AF/연사/SD,MMC카드	373,000	18	02년
<input type="checkbox"/>	삼성테크윈	Digimax410	410만화소(0.56")/1.6"LCD/3배줌/동영상+녹음/음성메모/한글/CF카드	374,000	4	02년



?

(selection sort)

- (selection sort):



1/2



```
#include <stdio.h>
#define SIZE 10

void selection_sort(int list[], int n);
void print_list(int list[], int n);

int main(void)
{
    int grade[SIZE] = { 3, 2, 9, 7, 1, 4, 8, 0, 6, 5 };

    //
    printf("          \n");
    print_list(grade, SIZE);

    selection_sort(grade, SIZE);

    //
    printf("          \n");
    print_list(grade, SIZE);

    return 0;
}
```

2/2

```
void print_list(int list[], int n)
{
    int i;
    for(i = 0; i < n; i++)
        printf("%d ", list[i]);
    printf("\n");
}

void selection_sort(int list[], int n)
{
    int i, j, temp, least;

    for(i = 0; i < n-1; i++)
    {
        least = i;

        for(j = i + 1; j < n; j++) //
            if(list[j] < list[least])
                least = j;

        // i         least
        temp = list[i];
        list[i] = list[least];
        list[least] = temp;
    }
}
```

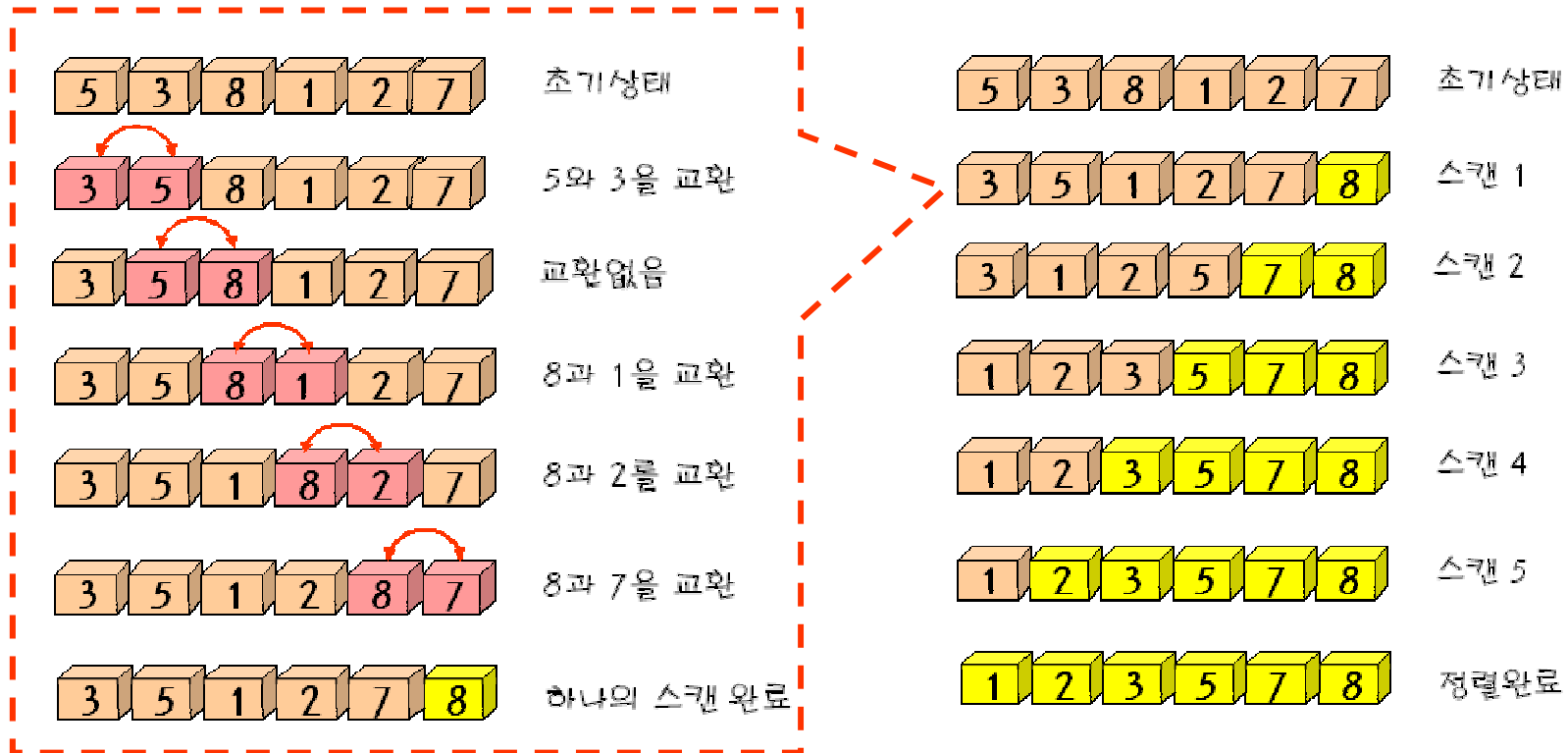


3 2 9 7 1 4 8 0 6 5

0 1 2 3 4 5 6 7 8 9

(bubble sort)

- 가
- 가 /





```
void bubble_sort(int list[], int n)
{
    int i, scan, temp;

    //
    for(scan = 0; scan < n-1; scan++)
    {
        //
        for(i = 0; i < n-1; i++)
        {
            //
            if( list[i] > list[i+1] )
            {
                temp = list[i];
                list[i] = list[i+1];
                list[i+1] = temp;
            }
        }
    }
}
```




```
#include <stdio.h>
#define SIZE 6

int seq_search(int list[], int n, int key);

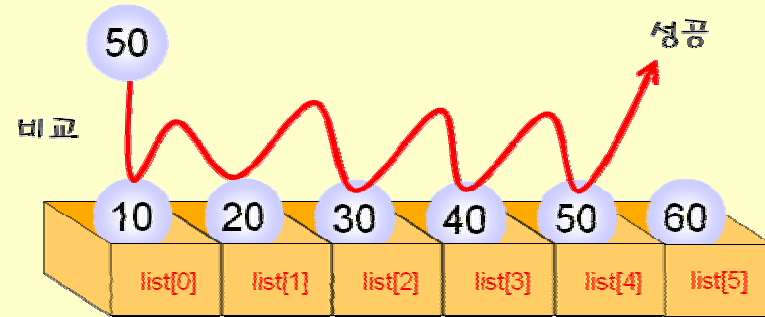
int main(void)
{
    int key;
    int grade[SIZE] = { 10, 20, 30, 40, 50, 60 };

    printf("          :");
    scanf("%d", &key);
    printf("          = %d\n", seq_search(grade, SIZE, key));

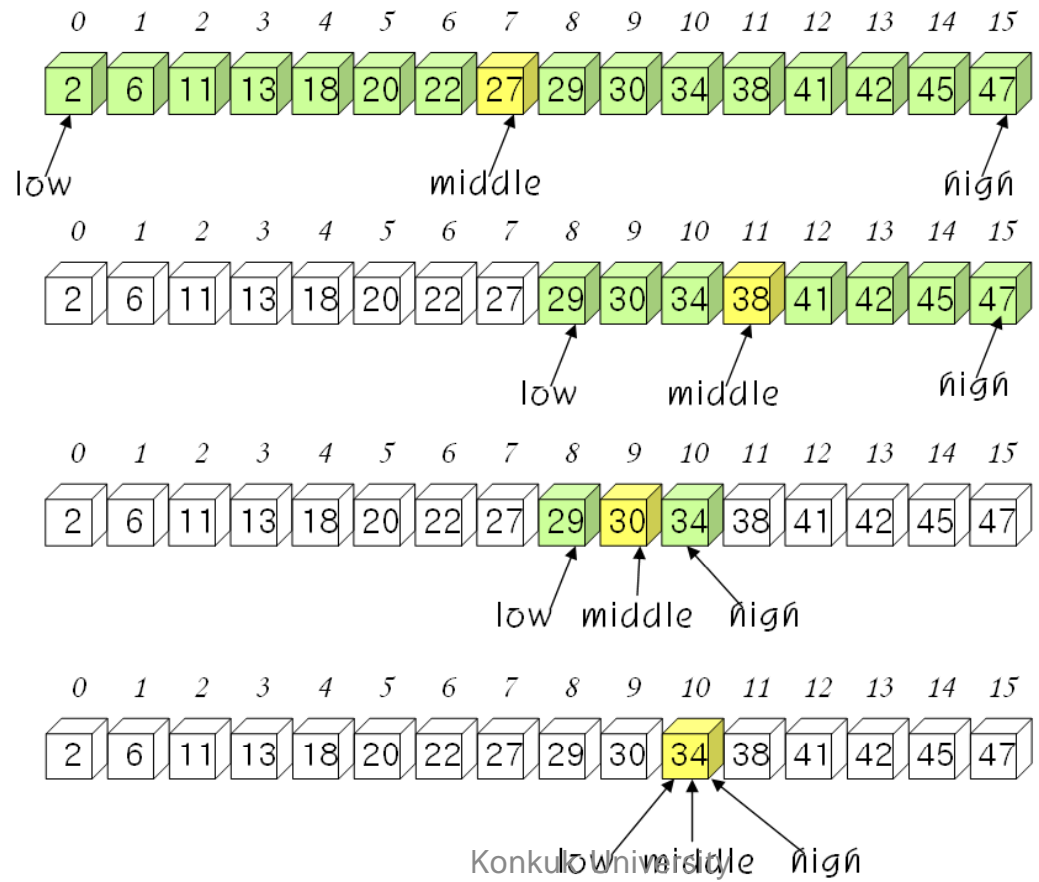
    return 0;
}

int seq_search(int list[], int n, int key)
{
    int i;

    for(i = 0; i < SIZE; i++)
        if(list[i] == key)
            return i; //
    return -1; //
}
```



- (binary search):





```
int binary_search(int list[], int n, int key)
{
    int low, high, middle;

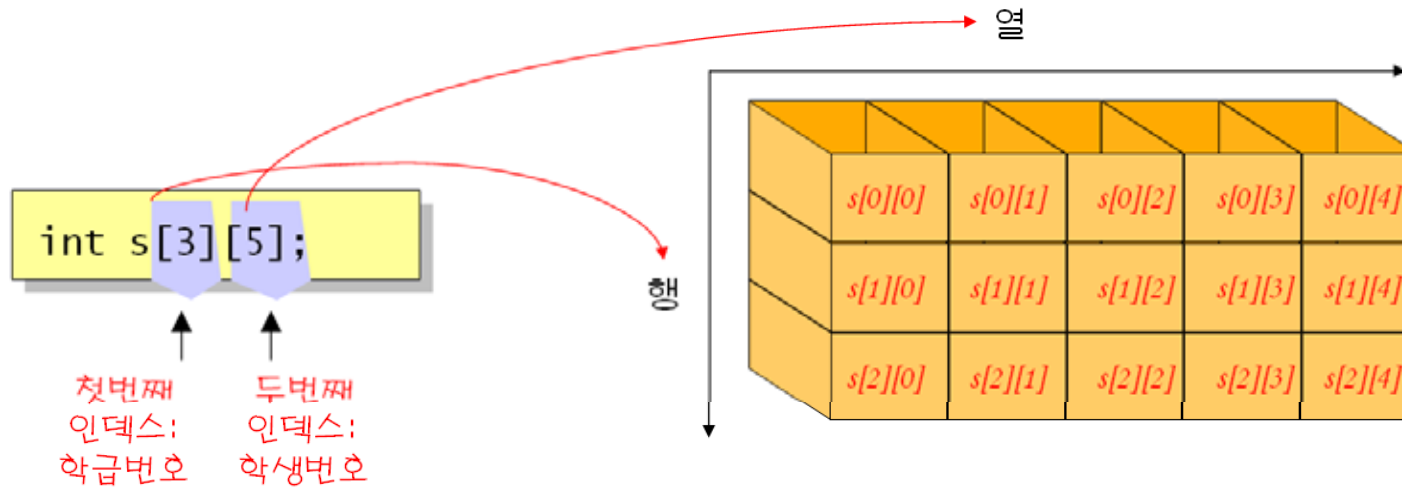
    low = 0;
    high = n-1;

    while( low <= high ){ //
        middle = (low + high)/2; //
        if( key == list[middle] ) //
            return middle;
        else if( key > list[middle] )//
            low = middle + 1; //          low
        else
            high = middle - 1; //          high
    }

    return -1;
}
```

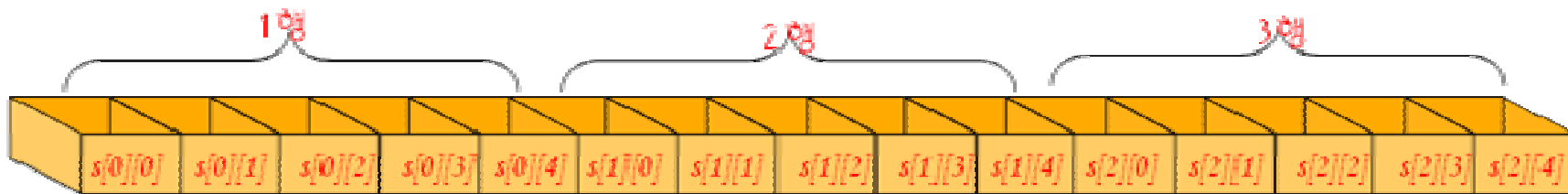
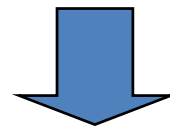
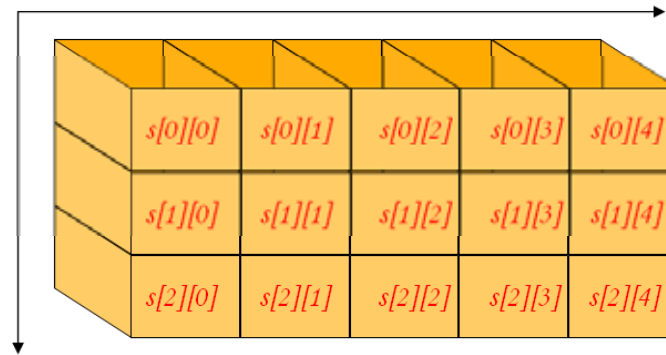
2

```
int s[10]; // 1  
int s[3][10]; // 2  
int s[5][3][10]; // 3
```



2

- 2 1 .



2



```
#include <stdio.h>

int main(void)
{
    int s[3][5];    // 2
    int i, j;      // 2
    int value = 0; //

    for(i=0;i<3;i++)
        for(j=0;j<5;j++)
            s[i][j] = value++;

    for(i=0;i<3;i++)
        for(j=0;j<5;j++)
            printf("%d\n", s[i][j]);

    return 0;
}
```

2

```
int s[3][5] = {  
  { 0, 1, 2, 3, 4 }, //  
  { 10, 11, 12, 13, 14 }, //  
  { 20, 21, 22, 23, 24 } //  
};
```



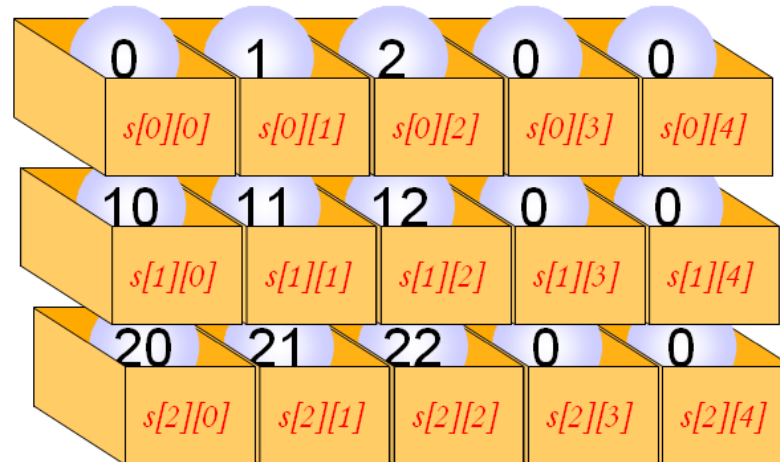
2

```
int s[ ][5] = {  
  { 0, 1, 2, 3, 4 }, //  
  { 10, 11, 12, 13, 14 }, //  
  { 20, 21, 22, 23, 24 }, //  
};
```



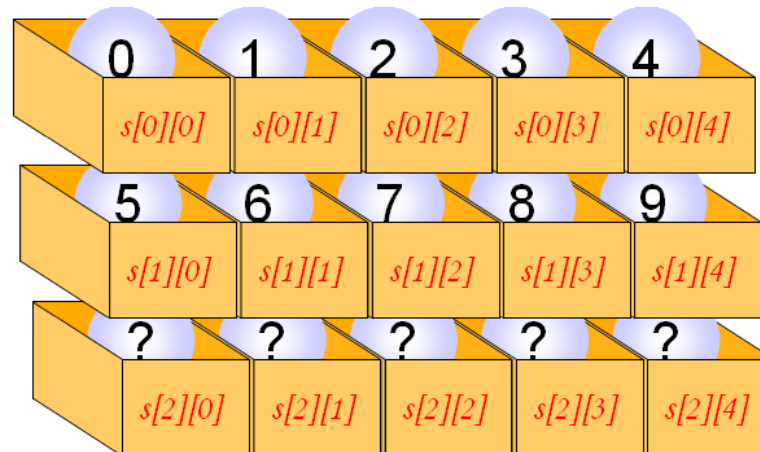
2

```
int s[ ][5] = {  
  { 0, 1, 2 }, //  
  { 10, 11, 12 }, //  
  { 20, 21, 22 } //  
};
```

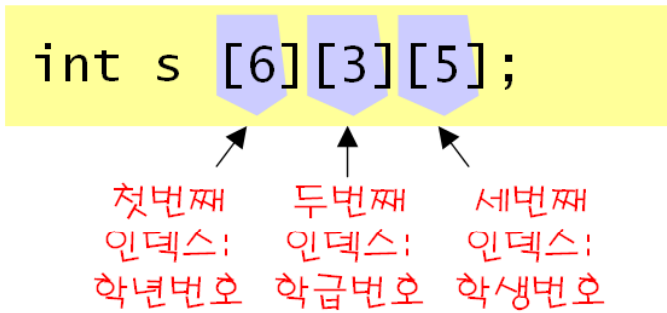


2

```
int s[ ][5] = {  
    0, 1, 2, 3, 4,    //  
    5, 6, 7, 8, 9,    //  
};
```



3



```
#include <stdio.h>

int main(void)
{
    int s[3][3][3];    // 3
    int x, y, z;      // 3
    int i = 1;        //

    for(z=0;z<3;z++)
        for(y=0;y<3;y++)
            for(x=0;x<3;x++)
                s[z][y][x] = i++;

    return 0;
}
```



```
#include <stdio.h>
#define YEARS 3
#define PRODUCTS 5

int sum(int grade[][PRODUCTS]);

int main(void)
{
    int sales[YEARS][PRODUCTS] = { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} };
    int total_sale;
    total_sale = sum(sales);

    printf("          %d          .\n", total_sale);
    return 0;
}

int sum(int grade[][PRODUCTS])
{
    int y, p;
    int total = 0;
    for(y = 0; y < YEARS; y++)
        for(p = 0; p < PRODUCTS; p++)
            total += grade[y][p];
    return total;
}
```



```
#include <stdio.h>
#define CLASSES 3
#define STUDENTS 5
```



```
0           = 2
1           = 12
2           = 22
           = 12
```

```
int main(void)
{
    int s[CLASSES][STUDENTS] = {
        { 0, 1, 2, 3, 4 }, //
        { 10, 11, 12, 13, 14 }, //
        { 20, 21, 22, 23, 24 }, //
    };
    int clas, student, total, subtotal;
    total = 0;
    for(clas = 0; clas < CLASSES; clas++)
    {
        subtotal = 0;
        for(student = 0; student < STUDENTS; student++)
            subtotal += s[clas][student];
        printf("    %d           = %d\n", clas, subtotal / STUDENTS);
        total += subtotal;
    }
    printf("           = %d\n", total/(CLASSES * STUDENTS));
    return 0;
}
```



```
#include <stdio.h>
#define ROWS 3
#define COLS 3

int main(void)
{
    int A[ROWS][COLS] = { { 2,3,0 },
                          { 8,9,1 },
                          { 7,0,5 } };
    int B[ROWS][COLS] = { { 1,0,0 },
                          { 1,0,0 },
                          { 1,0,0 } };

    int C[ROWS][COLS];
    int r,c;
    //
    for(r = 0;r < ROWS; r++)
        for(c = 0;c < COLS; c++)
            C[r][c] = A[r][c] + B[r][c];
    //
    for(r = 0;r < ROWS; r++)
    {
        for(c = 0;c < COLS; c++)
            printf("%d ", C[r][c]);
        printf("\n");
    }
    return 0;
}
```



```
3 3 0
9 9 1
8 0 5
```

$$A = \begin{bmatrix} 2 & 3 & 0 \\ 8 & 9 & 1 \\ 7 & 0 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 0 & 0 & 7 & 0 & 0 \\ 9 & 0 & 0 & 0 & 0 & 8 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

Q & A

