```
# Two ways to mitalize Constructor's
  i) Using Member intialization list to only method for mitializing
     public:
        Point (int 120, int 120): x(1), y(1) {}
  ii) Using assignment
  Public:
       Point (int i=0, int j=0) {
* Juheritance constructors
   class away
                   ((dr.)) assor " wood) ) and
   protected:
     int length;
      int breadth;
                             some of the contract the second
   public:
    area ( int 100, int boo) : lenger (1), brader (b) {}
   Class, volume ?
    protocted: private:
     int neight;
    public :
    volume (int h=0, int 1=0, int b=0): lega area(1,6), height (1)
    void get Volume () {
```

(out & length " breadth " height exend!

The state of the state of

int main () § volume v(2,3,5); v. geevolume (); reburn o;

```
* Function overloading (constructor)
  class Dimensions &
    private:
                    FILE 29
                                                  · UT WAY to
        int length;
        int breadly regulated and related the
        int height.
           his war is found production is from the strain
                                       edyline - office
  4 public :
      Dimensions (int len, int br, int h=0): lengar (lew, breadtractor),
                                          height (h) 23
       void calcareacs &
            Cout < C length + breadon < cond!
                               3 (++, 3512 x , (02) 1m) red
        void calcholime () {
           Cout << length + breadth + height << end);
    int main () §
       Dimensions ( 5,10);
       rect. calc Area();
       Dimensions & box (5,10,4);
        box. calc Volume ();
      return 0;
* member function overloading
  Class Dimensions &
    parate:
                                              int main () {
     double lengn;
                                                Dimensions snape;
      double breadly;
                                               Shape setoin (2,4);
      double height
                                              contic snape calculates
                                                shape setom(214,5);
      set void set Dim (double 1, double b) &
                                                cout ex shape (alculated)
          len = 1
         br= b
                                                repun 0
      void set Dim (double 1, double 10, double 4) }
          len=1; br=b; k=h; 3
      double calculate?
         if Cheight==0) { return length + breadth }
         else Creturn length * breadh + neight }
```

* Dynamic memory Allocation (constant proportion of the text i) int * numPtr = new int; int van = 34; int *p; * num Ptr = 5; p = Dvar couter " allocated out value" << * numptr << endly delete number; -> deallocating -> numper is now adapping pointer numPtr = nullptr; (points to an invalid menory location (i) int*arr = new int[sze] Im post in languary il delete [] am, 2000 Asias black int *ptr = arr 11 ptr points to first element of the away for (int i=0; i < size; i++) { Cout << * ptr << " " " " (200) DINGHERONSK SILE) * Setw COMPADING 2000 cout << "m=" << setw(s) <<enal Disconsions & box (Cout (< " n= " (< set w(5) < < enal The Course Course Source 1234 78 reforme variable * Plant total = 100; * switch (expression) { float &sum = total Case const 2: action 1; bear; Contice sun (100) Case Const 2: active 21 Couter Down break! COXELLOS } ontputs be default: memory address action "; Sun retrence " Carried & Margaret and Mary () - 2 () - 3 (of the and the settle sorry 31 medal Ar 18 18

memory

* can be defined outside class using :: * ENUM 1 (28 1 shuts) Inshut i) enum char {a = 3, b = 7, c, d3; value of c is 8, d is 9 (default =) increment) is) enum Color & Red, Green, Blue 3 Color my color = Green; Il Declare a variable of type color if (my coor == Red) { (out <<" color o red" < cerd1 else if (my color = = areen) { not properly of # cont c(" color is grown Kandl (Strasted 4 else of (when) cont else 2" invarid color"} PARIA DIMALIFOR TO * # define Pi 3.14/0 210polos of to como no 20100000 11 0 int "petc" - new instead the first planent in the total sur * Size of (vertable) int - 34 to make dimensional communities (40r -> 1 int * muns = new and [1][1] float -> 8 double -> 8 * Default Arguments est that you got as it so to what the void temp (int =10, float = 8.5); int main () & 2 tenp() * () Sellen (* Jas) i) void temp (int i, float f) 11 i=10, f=8-5 (default rather) (i) temp(6) \Rightarrow (i = 6 f=85) iii) temp(6,2.5) → (:=6, f=25) iv) ten (3.5) => (invalid) -> missing argument must be last argument of 15st int mul (int i , int i = 5 inth = 10); 11 legal int mul (mti=0, int j, int x=7); "illegal

```
* Copy Constructor,
                          are della distance handale ad una for
     Student (Student &s) {
          rollno = s.rollno;
      3 mark s = s marks;
                            Carley and bad I roled four & Con
    I side mais O & a most il proces a modern relad
        Student 55=51 (already paraternized initialized)
  * Destructor
                            they 23 " her stakes" 22 June 1986
     ~ Student();
 * DYNAMIC ARRAY:
                                    Erislas tricaris 3 21/7
    int *ptc = new int[b]
   # 11 allocates an erray of 10 integers and returns a pointer to the first element in that away (which is used to initialize ptg)
    For multidimensional arrays:
     int * mms = new int[x][4][5]
                               Tonly first dimension can be a remable
     delete [] por indicates to compiler that the pointer addresses
                      an away of elements the Day of the
* MALLOC:
                                Blancon on,
   Int * nums =
```

Int * nums = (int*) malloc(5*sizeof(int));

free (nums)

to call member function of class

using par per -> disp();

cls *ptr = new cls 11 calls default constructor of cls

cls *ptr = new cls 11 calls parameterized constructor of cls

(ls *ptr = new cls 11 calls parameterized constructor of cls

(new returns a pointer to the object of he

```
10/44 7/6 1 DA TALY 1 TO HAT TON 15/09 4
* Public - Can be accessed from anymore outside
  Protected - are accessible only in a class derived from base class
  Private - only accessible from within the class
                                 2003 Orack Box booking
 * INHERITANCE
                                              Cr gran men int (5)
                   Harry >> " separa
    Class person &
         protected:
         Public :
             void getdata () ?
               cin)
              void display() {
                Cout CC
     3;
```

Class employee: public person {

Protected:

public:

person : = get data ();

yound dis co &

person :: display();

cout cc ~

3;

of Class teamer: public person, proble employee

```
* POLYMORPHISMI VIRTUAL I OVERRIDE
 # include <iostream>
  class shape { was not made and a service
  pubic:
      virtual roid draw () const {
           Contex" drawing a shape "exend;
 Class circle: public shape {
 public:
                                 SO adobtop how
     void draw () const override {
          Cont << "drawing a circle" exend;
Class Square: public square & and strong & sopplying act
     void draw () const override {
          Contac "drawing a square" << end);
     3
                        person it get data (
int main () {
  Shape shape = new circles;
   Shape + Shape 2 = new squares;
                                                Circle shape
                                                Square shape?
   shape 1 -> draw (); II calls circle's draw method
                                                Shape 1 - drow
   shape2 -> draw(); 11 calls square's draw method
                                                Shapez. droul
   delete snapel;
   delete Shape 2;
                                                rebin o
  return 0;
```

* ASCII * FRIEND' FUNCTION: O- NULL class book & I was seeld 32- Space private: int boo; I A coals coops 48 - 0' char brane [20]; 57 - '9' Public: 65 - 'A' void getdatal); 90-121 3: friend roid show (book); void book !! get data () ? 97 - 'a' 122 - 121 CM >> bno>> bname, 3 rold snow (book px) { i) A+32 = 'a' (out < C bk. bno < bk. bnane; main & class class 6 } book b; THE TO SERVE THE SERVENCE OF T b. getdata(); (Snow (b). Class ClassB; Il forward declaration Pho areas class class A & int main() & Private: ClassA objA; ant Ai class B obj B; public: obja. Set Aval (5); yoursety restart orois set Bral (10); void set Aval (intral) { friend Function (ob; A, ob; B); friend void FriendFunction (class A, class B); return O; Class ClassB & private: m int B; 3+1100 & 440/) public : my void set Bral 10 00 me " KK OD friend void friend Function (Class A Obj A, Class B obj B) & Cout << obj A. A << e-al Cont KC Obj B. B KC end 3

```
* FRIEND CLASS ALTERNA DELLA TO
    Class ClassB; 11 forward declaration
                                               25009
    Class class A ?
       Private: Sestamond and
                                                10 -
          int num A' 10 100 bis
                                               14'
        friend class class B/
       Public : ) at ab to so sood book
         Chase bus 200 again
         3 (hum A = 12;
       3:
  Class Class B &
                   id wood
      Private:
       int num B ; stables of
                                      AND SER FREE PARTY
     public:
                   as closed window by accord of
   NumB = 1; } Constructor
                                        $ A 20010 220
                                        1 1000
                                        - (A 3)
int add () {
                                           . 31629
                                      and then do that
of Hard fat a do
 Class A objA;
                            Youd See Aut Contral) ?
return ObjA. Num A + num B;
             (aust A cool Friend Friend (day A days)
                                  13 (18cel) 2 2 6
 int main () {
                                    A 101 21 11 10
    class & objects;
    Cout << "sun: " << object B. add);
 tide a 12 st. Aids Acros (a Charles bion busis)
    rebum 0;
                       100 33 A . A(do - 23 to)
                      Mark 32 3 3 100 - 201
```

1) ARRAY

#include (array)

array Lint, 5> arr = {1,2,3,4,5};

int size = arr. sizec);

awat(2) -> outputs 3 Element at 2nd index :

arrempty(); -> bool I or Onot empty

FIRST ELEMENT: QTV. front(); -> first element

LAST ELEMENT: arr. back(); -> last element

2) VECTOR

I dynamic allocate | doubles current size, copies current elements in new, dumps old

include <vector>

a vec. begin(); -> pointer to first element vec. end() -> pointes to last element

rector <iut> v;

V. shrink_to_fit(); -> reduces capacity to fit its size b

V. Capacity (); -> shows how much space is assigned I beyond capacity

v. size (); - > shows number of elements in vector currently

v.pusw_back(1); -> adds element with value 1 to rector at the

x pask 2 Stout (5);) adds clement work work to the the

V. pop-back (); -> removes last element in vector form one

V. Clear (); -> empties vector

vector Lint > Vec (5,2) value assigned to all elements Size (no. of elements)

vector Line> copy (vec); VI. Swap(U2);

-> value of inserted element VECTORIAL COOK

vec. insert (vec. begin()+3, 100); -> inserts after 3rd element

at position 3 (o-based i

```
3) DEQUE
       # include <deque>
      dequekines d;
       d. push-back (1)
       d. push - Front (2);
                               -) outputs 2
      d. pop-back (); } delete accordingly
     d.crase (debegin (), d.begin +2); -> will delete first zelemant
                       d.endes
                                   -> Pull deque
  3) LIST
    11 no random across provided X 1[i]
    # include <list>
    list(int);
    1. push-back();
                      1. begins) ;
                                  1. fout();
                                             1. enpty ();
    1. push-frontis;
                      1. endo;
                                  1. back();
                                             1. erase (1. begins);
    1. POP-back()
    1. Pob _ fronto;
                     1. sizeci;
4) STACK
  LAST IN FIRST OUT
                             Mew element is added atome
                              end (top) and an element is removed from that end only
 # include (stack)
 stack(string> 3;
 s. push ("hello"); -adds at the back
  S. Push ("world");
  S. top(); -> woodputs would
  5. POP (); -> deletes top element
```

EXCEPTION HAMPLING 5) QUEUE FIRST IN FIRST OUT Helements one inserted at the book and are deleted from the front * # include < queue> Smarket Shill with queue <string> 9; in a nowestate sty! or push ("world");] queue will be Ethello, world's a. pop (); -> renoves from the front INT INCHES void showar (queue (int) a) Amende calegoril while (!q.empty(){ #include Kalgorithm> coutce q. front(); max (a) swap min 9. POP(); reverse (s. begin, s. end) Sort (ver. begins), ver. end());)
Sort (ver. begins), ver. ends greater kintxi track out of boats", 6) PRIORITY QUEUE descending order priotity-queue kints maxq; = 196) 71 January & programa kind of Breatmont with a will and maxq.top(); -> with greatest element from one front maxq. pop(); -> element with greatest value is popped priority_queukint, vectorkints, greaterkints) ming; Court Ke Str Kend J) MAP First to second #include <map> mapkint, strings m; Control (KCO A); m[1] = "hello". m. (ount (12); -> 1 m [12] = "horld". m. (ount (s); \longrightarrow 0 m[3] = " you".
m[4] = " such "; m. erase (1); - erases I erase by key for (auto i:m) = { i. firsts -> ascending order first element

i. Second - corresponding string

auto it = m. find (3); -> jeturns ; terator to that

particular element

```
MULTIPLE CATCH STATEMENTS:
```

include <iostream> using namespace std;

int main () {

double num, den, artif { 0.0,0.0,0.0,0.0}; int index

Contect " Enter array index"; cm >> index;

try {

if (index >= 4)

temow "Error: Index out of bounds",

Cin>>nun>>den;

contact montacase

Exercise if (den ==0)

throw the state of the office of th

Cont << num I den << end);

I catch (const chart str) {

cont << str <<end);

3 catal (int i) { contac iccordi;

3 cont (< "unexpected exception" < (end);

SIMPARD EXCEPTION: # include < iostream>
include < exception> 是如何的原因多为的心力。 using namespace std; int main () { 3 () Man July by E if (b == 0) (= 20; ofstreen that: "test upon (" file Houdler test" throw runtine error ("divide by zero error"); cont << (- (alb) (cerd); 3 to Catch (nutine_error se) { contac e. whates a cendly Albahala" Jargo - m7 KINDS CHAR SECON State Bride ii) to 2 3 (12 31 MM int + huge Array = new int [100000000000]; 3 catch (bad-alloc & se) } (DO) 17777, france contex e. what() < (enal; رصط درور دودو (1)02013 197 THROW FROM FUNCTION: boid exhaudler (int*ptr, int nun) throw (int*, int) { pa { it (ba= mrr) TRIPLACE CLASS - BUEBLI STRT if (num=0) Christman 810 C - < 7" 25.017 2 20 019-19 throw num; flast governo Total Total size) f 3 caton (...) § 10 to 1 - 2518 57 , 0 = 1 m Jrig contec "some exception was caught", ited no - qual T as CHILL OF CAMP int main E) § exhandler (nul, ?); CALLOTO - CENT

```
FILE HANDLING
                                        : MOST DX J CAN
                                        < 10 5930 x 9 > 36 W
  # include Liostercan>
                                       pro reactions of
  # include <fstream>
  int mancs q
                                   (25:2) 0 d, 01 = 3 tal
    ofstream fout;
                                        (0== 1)7
   fout. open ("fileHandler.txt");
                                 ( purou making const
    font << " Kello from program";
   fout. (lose ();
                      $ (93 Your Smar ) Alan & got
    ifstream fin;
   fin . open ("fileHandler. tot");
   Example Char such;
                               string stri;
   while (1) {
                               while (1) {
      fin . get ( );
                                 る getline (fin, Str2);
       if (fin.eo@)
                               if (fin eoft)
        break;
                              3 break;
Contic str}
   Court << Ch GREGARD;
                                fin. closes;
    pin . close();
                                       CROW ENXIONS
   return o;
               * tri ) word ( we say day this) without y
TEMPLATE CLASS - BUBBLE SORT
template (class T) -> alternatively: template (type name T)
void generic Sort (T* arr, int size) {
    for Conti= 0; i < size-1; ++i) {
                                         } ( .. ) MU.)
       forcinj = 0; i < si2-1; ++ i) {
                                          de solves
            $[1+1] no < [1]
              T temp = arr [];
                   Guci]=am[j+i];
                   orr City = tem;
       3 3
```