Lesson 6
Structure

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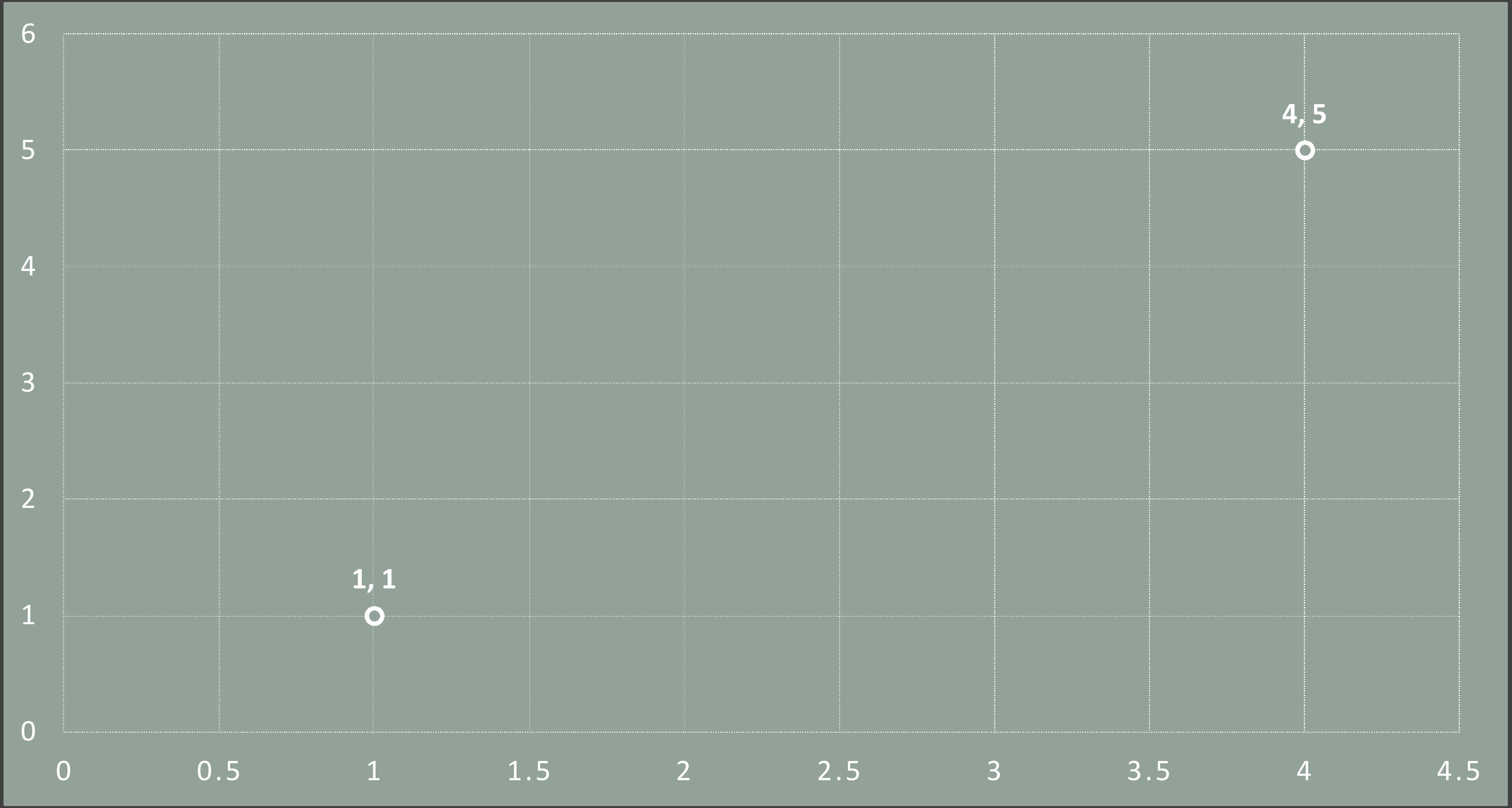
Cartesian Coordinates 直角坐標



How to store each point?

The old way, use variables like: x1, y1, x2, y2…

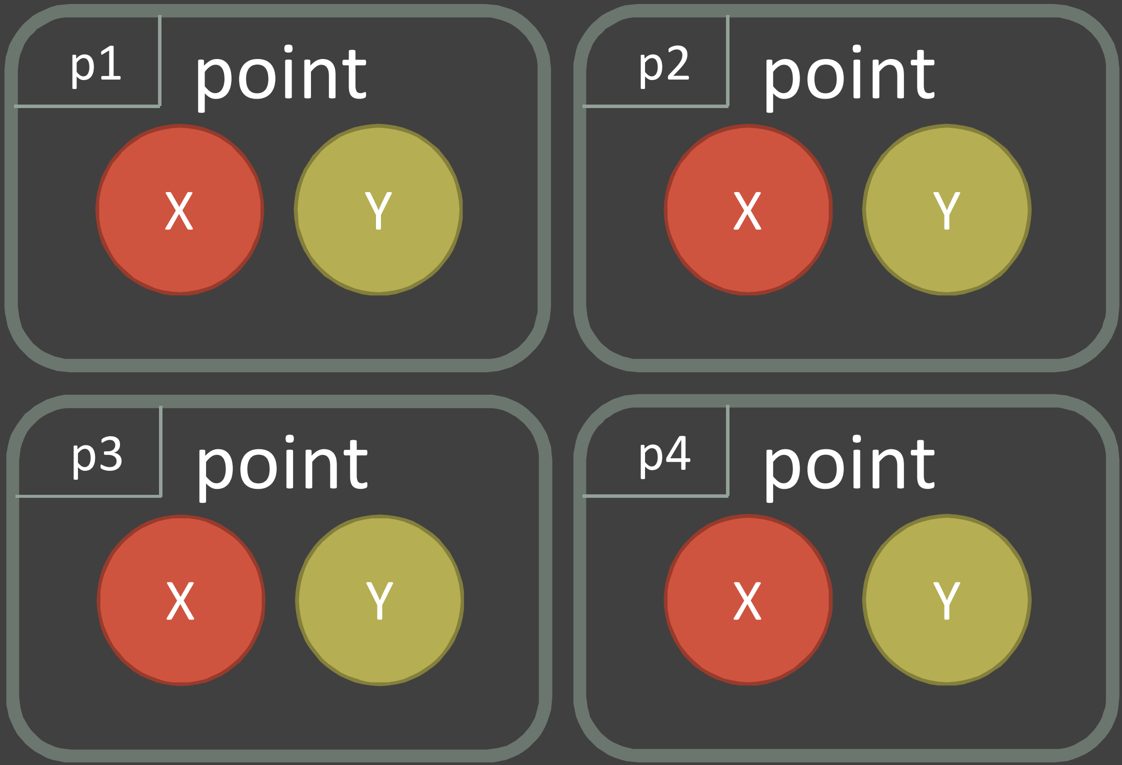
Maybe you are better, use arrays like: x[], y[]

The old way(X)

Use these methods can easily mix data together, may cause mistakes, and hard to manage information.

Structure(O)

Pack variables together! Then you can stand on a higher level.



How to define a structure?

Use the word “struct”.

```
struct point{           //point means name of structure
    int x;
    int y;
};      //remember the semicolon
```

Now “struct point” is kind of type.

How to use?

Just like using variable.

int i = 0;

struct point p0 = {0, 0};   //use braces if you want initialize

$\underbrace{\text{struct point}}_{\text{type}}$ p1;   //remember put “struct” in front

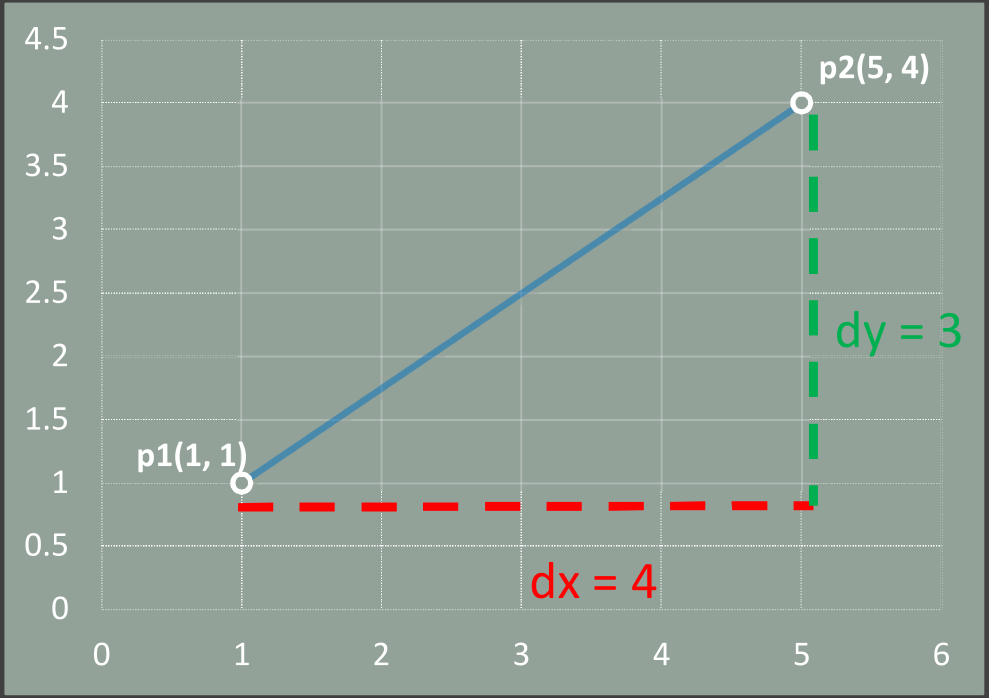
cin>>p1.x;   //use . to call member(成員)

Back to mathematic

Slope 斜率

How steep(陡) a straight line is.

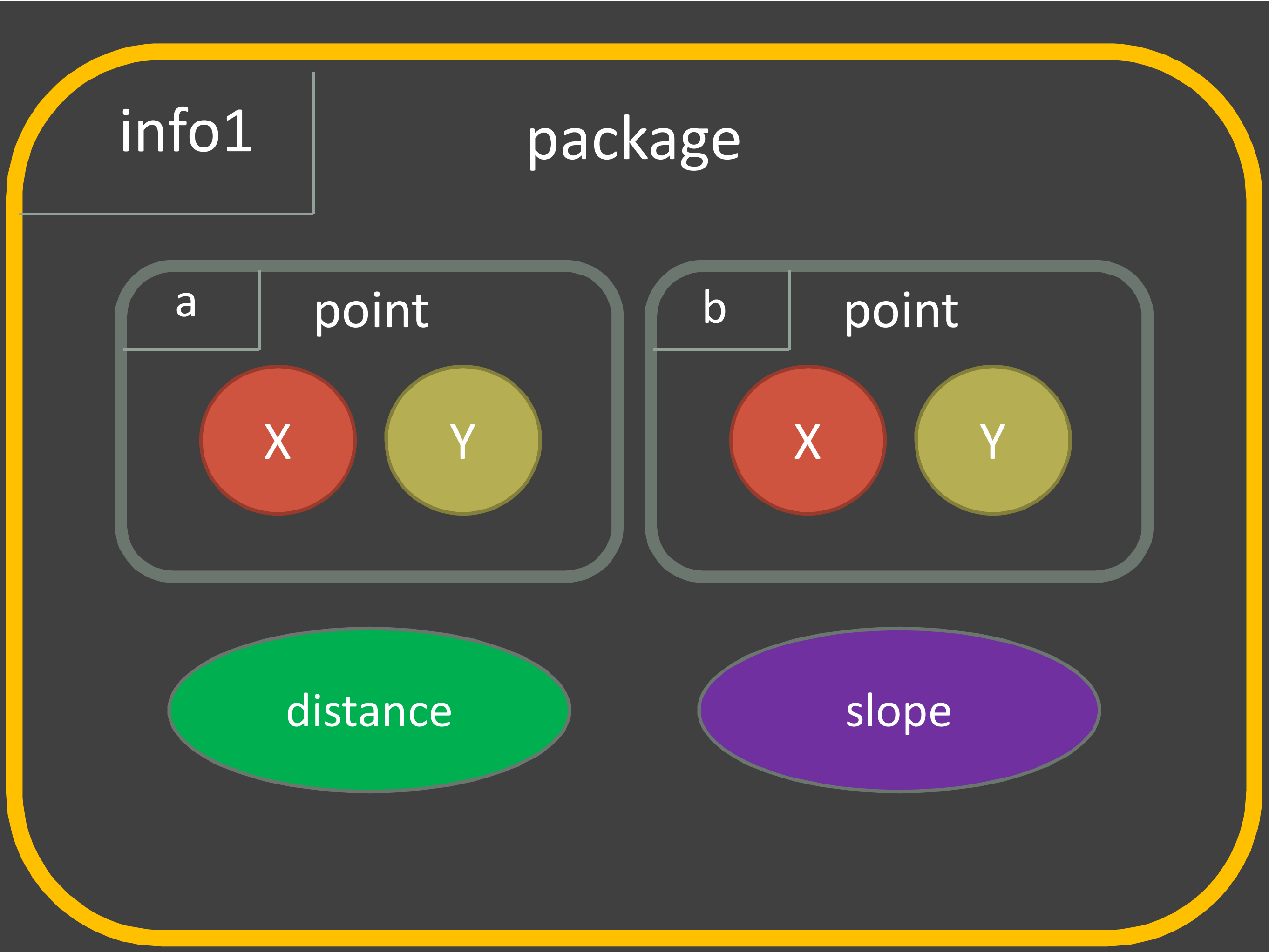
$$\color{red}{Slope = dy/dx} = 3/4 = 0.75$$



Exercise 1

Define a structure called “point”. Contains(包含) x, y. Calculate the slope between (0, 0) and p1.

Structure in Structure



How to define?

Procedure(步驟) is the same.

```
struct package{
    struct point a;
    struct point b;
    float distance;
    float slope;
};
```

How to use?

```
struct point p0 = {0, 0};

struct package info1;

info1.a = p0;

cout<<“a=(“<<info1.a.x<<“, “<<info1.a.y<<“)”<<endl;

//display a=(0, 0)
```

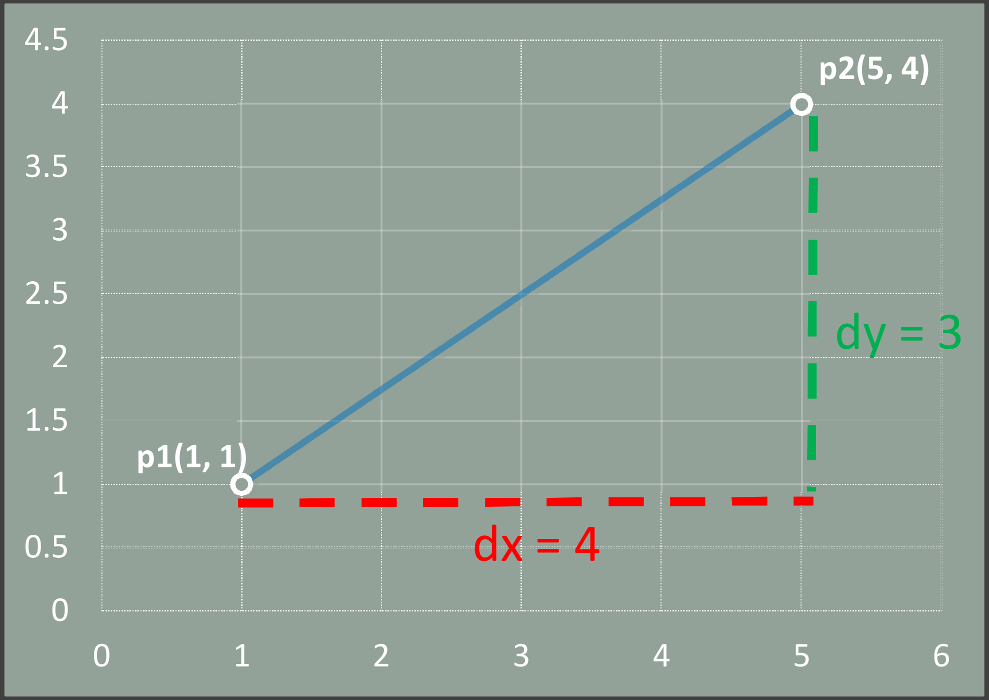
Back to mathematic

AGAIN~

Distance 距離

Use Pythagorean Theorem(畢氏定理) to calculate the distance between two points.

$$distance = \sqrt{dx^2 + dy^2} = \sqrt{4^2 + 3^2} = 5$$



Exercise 2

Define a structure called “package”. Contains two points, slope, distance. Calculate the slope & distance between two points.

<Tips>

#include <cmath>

Use function sqrt() & pow().

Use functions to simply your code.