FORM 4 PASCAL PROGRAMMING
Unit 1: Introduction & Program General Structure

March, 01

1.1. WHAT IS A PROGRAM（程式）?

- program is a set of instructions which tells the computer what to do;

1.2. WHAT IS "PASCAL"?

- Pascal is a high level computer language which encourages structured and disciplined programming and
- it was developed in 1970' s

1.3. SAMPLE PASCAL PROGRAMS

e.g. Printing a message

```
program hello;
begin
  writeln ( 'Hello, how are you?' );
  writeln ( 'I hope you enjoy studying pascal!' )
end.
```

```

```

e.g. Interactive program

```
program greeting;
var name : string;
begin
  writeln( 'What is your name?' );
  readln( name );
  writeln( 'Hello, ', name );
  writeln( 'Welcome to Pascal programming' )
end.
```

```
What is your name?
Andy↵

```

e.g. Calculating the area of a circle

```
Program AreaOfCircle;
const
  Pi = 3.14;
var
  radius, area : real;
begin
  write ('Enter the radius of a circle: ' );
```

```
  readln ( radius );
  area := pi * radius * radius;
  writeln ( 'Area of the circle = ', area:6:3)
end.
```

```
Enter the radius of a circle: 25↵
```

1.4. GENERAL FORMAT OF A PASCAL PROGRAM

```
PROGRAM NameOfProgram;
```

_____ 程序標題

(assign program identifier/name of the program)

```
CONST
  constant = value;
     :
     :
  constant = value;

VAR
  variable list : data type;
     :
     :
  variable list : data type;
```

_____ Part 說明部份

(describe the variables and constants used inside the program)

```
BEGIN
  statement;
       :
       :
  statement
END.
```

_____ Part 語句部份

(contains a sequence of statements that instructs the computer what to do)

1.5. PROGRAM HEADING

1.5.1. General Format Of Program Heading

- the program heading specifies a _____ for the program;
- the name of the program should reflect the _____ （目的）of the program

1.5.2. Identifiers （標識符）in Pascal programs

- Identifiers are the _____ of programs, data types, constants, variables, procedures and functions.
- There are **THREE** types of identifiers in PASCAL:

TYPES OF IDENTIFIERS	DEFINITION	EXAMPLES	RULES OF USAGE
_____ _____ ***保留字***	Names reserved by PASCAL for special purpose	`PROGRAM, BEGIN, END, VAR, CONST, REPEAT, WHILE, IF`	programmers should not use reserved words in any other way
_____ _____ ***標準標識符***	Names that have a predefined meaning in PASCAL	`INTEGER, REAL, INPUT, OUTPUT, WRITELN, READLN, SIN, COS`	programmers can redefine standard identifiers for another purpose

_____
Identifiers
用戶定義標識符
	Names made up by users	`X`
		`SUM`
		`temperature`
		`y12`
		`TABLE1`
		`Angle_3`
		`tax_rate`
			consists of letters, digits, and underscore (_) only
			the first character must be a letter
			cannot use reserved words

1.6. DECLARATION PART

The declaration part of the program is used to tell the computer the names of memory cells that are needed in the program. Thus ALL the data items used in program MUST BE defined in here beforehand. The declaration part consists of five sections: constant, type, variable, procedure and function.

1.7. CONSTANT （常數）DECLARATION

A **constant** is an identifier which has a _____ value throughout the execution of the program.

```
Const
  Identifier1 = value1;
  Identifier2 = value2;
```

e.g. A list of valid constants:

```
CONST
  G        =  0.98;              {real number               }
  Kelvin   =  -273;              {integer                   }
  My_Name  =  'Mary';            {string                    }
  PERCENT  =  '%';               {character                 }
  ILoveYou =  True;              {Boolean                   }
  Two_Pi   =  2.0 * 3.1416;      {arithmetic expression     }
```

1.8. VARIABLE（變量） DECLARATION

- A **variable** is a memory location (can be thought as a "box") which stores a value.
- The value is allowed to change during the execution of a program.
- All the variables must be declared to be some data type before they appear in the program.

```
Var
  Identifier1 : data_type1;
  Identifier2 : data_type2;
```

e.g. A list of valid variable declaration:

```
VAR
  Count               : integer;
  Area_of_Circle      : real;
  Sex                 : char;
  NameOfStudent       : string;
```

1.9. SIMPLE DATA TYPES

1.9.1. Integer （整數）

- An integer number is a signed "_____" from -32768 to +32767

Valid PASCAL integers	Invalid PASCAL integers
0 1 +1 60000 -1 743 -5280	23.65 1,999 63 668

1.9.2. Real number （實數）

- A real number must contain either a _____ or an _____ (or both)

Decimal Notation	Exponential Notation
0.0 15.2 123.0 0.87362 0.0000012	0 1.52E+1 (1.23E+2 (8.7632E-1 (1.2E-8 (

1.9.3. Characters（字符）

- A character is either a _____, a _____, or a _____ enclosed by a pair of apostrophes (') .

Examples of *valid* PASCAL characters	
'a'	'&'
'A'	'"'
'c'	'6'
'4'	' ' (a blank space is also a character)
'%'	

1.9.4. Strings（字符串）

- A string is a _____ enclosed by a pair of apostrophes (').

Examples of *valid* PASCAL strings
'Red'
'Tuen mun, N.T.'
'$19.50'
'123-45-6789'
'The correct answer is:'
'2*(i+3)/j'
''

1.9.5. Boolean

- A Boolean has only two possible values - _____ or _____;
- used to represent a conditional value and decision making

end of unit 1