1.

A.

```
c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\Exercise 1.cpp: In function 'int main()':
c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\Exercise 1.cpp:25:8: error: 'std::string Book::title' is private within this context
   25 |       b.title = "Redstone Guide"; // Uncomment to trigger error
      |         ^~~~~
c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\Exercise 1.cpp:6:12: note: declared private here
    6 |     string title;
      |            ^~~~~
c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\Exercise 1.cpp:26:29: error: 'std::string Book::title' is private within this context
   26 |       cout << "Title: " << b.title << endl;
      |                             ^~~~~
c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\Exercise 1.cpp:6:12: note: declared private here
    6 |     string title;
      |            ^~~~~
```

Private members can only be accessed within the class. To fix this I could set title as public

B.

```
3\output'
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output> & .\'Exercise 1.exe'
Publisher: Mojang
Author: Steven
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output>
```

Publisher is public member so it can be accessed from main. Public members don't keep data safe and encapsulated

C.

```
3\output'
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output> & .\'Exercise 1.exe'
Publisher: Mojang
Author: Steven
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output>
```

displayAuthotInfo() is a public method so it can be accessed form main. If it's changed to private it will result in a compile error.

D.

-Private is accessible only within the class. It keeps data safe and encapsulated

-Protected is accessible within the class and derived classes. Useful for inheritance.

-Public is accessible from anywhere. Interface for the class.

E.

Class is a user-defined data type that encapsulates data and functions. Classes help with organizing code into smaller sections, make it easy to model real-world entities, protects internal state using access specifiers.

2.

A.

```
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++> cd
 'c:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
3\output'
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output> & .\'Exercise 2.exe'
Student Info:
Name: Steve
Age: 21
Grade: A
Group: 2025 group
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab
 3\output>
```

The program can be compiled because the setter and getters are public methods and they are in the same class as the private data. That means that the private data can be accessed from main.

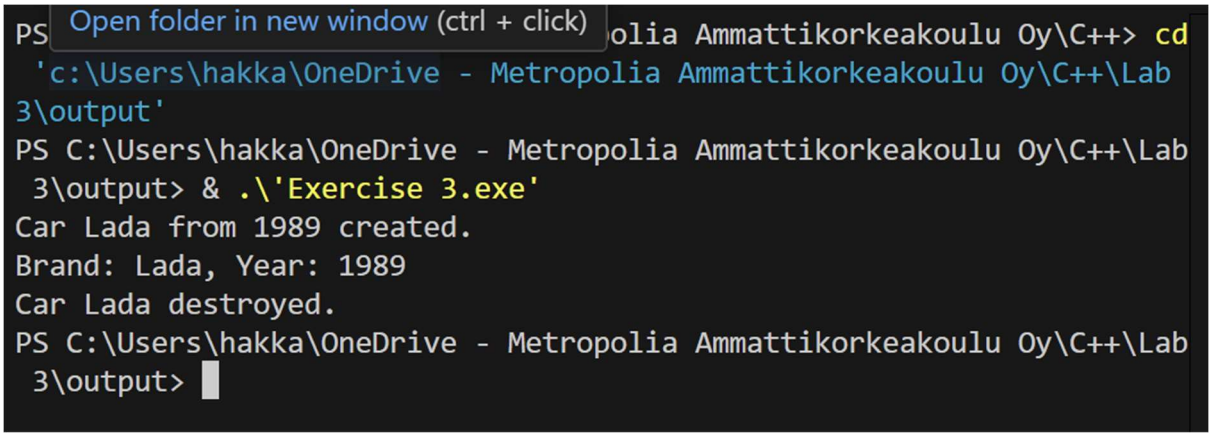
B.

Setters are good at setting or modifying private attributes. Getters are good at accessing them.

C.

Group (string) = “2025 group”; means that every student object will have group set to “2025 group”.

3.



A.

A Constructor is a special function inside a class that is automatically called when an object is created. It's used to initialize new class members.

B.

A destructor deletes resources that a object has acquired. This frees up resources and dynamically allocated memory.

C.

Constructors and destructors don't have a return type, not even void

D.

New uses memory until delete is called, stack is delted until it goes out of scope.

Memory has to be allocated manually with a new. Stack does it automatically.

E.

The compiler provides a default constructor with no parameters

F.

The compiler provides a default destructor that does nothing.

4.

```
PS C:\Users\hakka\OneDrive - Metropolia Ammattikorkeakoulu Oy\C++\Lab 3\output> & .\'Exercise 4.exe'
Brand: Generic
Year: 2015
Starting engine of Vehicle

Brand: Toyota
Year: 2021
Number of doors: 4
Car engine is starting!

Brand: Hyundai
Year: 2023
Number of doors: 4
Battery Capacity: 0 kWh
Electric engine is starting... Silent but powerful!

Brand: Nissan
Year: 2022
Number of doors: 4
Battery Capacity: 40 kWh
Electric engine is starting... Silent but powerful!
```

A.

Inheritance allows a class to acquire properties and behaviors from another class. A derived class can access the public and protected members of its base class, but not the private members directly.

B.

One constructor sets default values, the other lets you give custom ones. This gives flexibility when creating objects.

C.

The compiler calls the base class's default constructor. If there isn't one, the code won't compile.

D.

Output will be:

Brand: Nissan

Year: 2022

Number of doors: 4

Battery Capacity: 40 kWh

Electric engine is starting... Silent but powerful!

This happens because the parameterized constructor sets all values, and the overridden methods are called.