E26

Describe Pros and Cons for each design. Factor including:

- simplicity of code.
- efficiency when creating instances.
- efficiency when converting systems.
- amount of memory used.

	pros	cons
Design 1	• Take less memory since there is only one instance. • easier to code since no subclass are required.	• Take more time to convert from one system to another. • Take more time to create instance since system type are required.
Design 2	• Easier to code since only one type of system are considered. • Take less time to create instance.	• take more memory since new instance are created when converting coordinate system. • Take less time to convert from one system to another since no need to check system type.
Design 3	• Easier to code since only one type of system are considered. • Take less time to create instance.	• take more memory since new instance are created when converting coordinate system. • Take less time to convert from one system to another since no need to check system type.
Design 5	• Take less time to create instance since we have subclasses representing different system. • Take less time to convert from one system to another since no need to check system type.	• take more memory since new instance are created when converting coordinate system. • complex to code since methods for each system have individual subclass.

E28,29,30

This test considers the constant value and system, we are trying to find out the efficiency of system converting from Design1 and Design5. The test will generate a random integer for both Design1 and Design5 to iterate and do the coordinates retrieving and system converting method during each iteration. The timer for both design is considering milliseconds.

	Design 1	Design 5
Test1	8258 times of design1: 0 milli seconds	8258 times of design5: 2 milli seconds
Test2	3862 times of design1: 1 milli seconds	3862 times of design5: 0 milli seconds
Test3	9575 times of design1: 1 milli seconds	9575 times of design5: 2 milli seconds
Test4	4439 times of design1: 1 milli seconds	4439 times of design5: 2 milli seconds
Test5	7338 times of design1: 2 milli seconds	7338 times of design5: 1 milli seconds
Test 6	6300 times of design1: 1 millis seconds	6300 times of design5: 4 millis seconds
Test 7	1258 times of design1: 0 millis seconds	1258 times of design5: 0 millis seconds
Test 8	4798 times of design1: 2 millis seconds	4798 times of design5: 2 millis seconds
average	1 millisecond	1.625 milliseconds

Conclusion:

From the result of 8 tests above, we can tell that the average time required for the same amount of iteration for Design1 is 1 millisecond and for Design5 is 1.625 millisecond, which means that Design 5 usually takes more time to do the coordinate system conversion than Design1. This proved the hypothesis on E26 that Design 5 takes more memory space than Design1 when converting coordinate systems.