



## ASSIGNMENT (8)

### Question (1):

Create a class that defines a *Vehicle*. A Vehicle could be a *Car*, *Truck*, or *Motorcycle*.

- Any *Vehicle* has the following common attributes:
  - Cylinder Capacity (e.g. 1600)
  - Maximum Speed (e.g. 220)
  - Model (e.g. 2006)
  - Manufacturer (e.g. Suzuki)
  - Price (e.g. 99500)
- A *Car* has the following specific attributes:
  - Transmission type (e.g. Manual)
  - Number of passengers (e.g. 7)
- A *Truck* has the following specific attribute:
  - Load capacity (e.g. 1500) – in kilograms.
- A *Motorcycle* has the following specific attributes:
  - Number of tyres (e.g. 3)
  - Side car (e.g. true or false) – this attribute indicates whether the motorcycle has a side car or not.
- Each class has methods for setting and getting the values of its attributes.
- Each subclass has a method for printing its information (i.e. the common attributes as well as the specific attributes).
- The subclasses *Car*, *Truck* and *Motorcycle* inherit all attributes and methods of the superclass *Vehicle*.

**In the main function, write a program to:**

1. Create two cars, two trucks and two motorcycles.
2. Set the attributes of all vehicles using the following data as an example:

Cars:

CC: 1600 Speed: 225 Model: 2007 Manufacturer: OPEL Price: 156000 Transmission: Manual Passengers: 5
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CC: 1800 Speed: 244 Model: 2006 Manufacturer: BMW Price: 350000 Transmission: Automatic Passengers: 5
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Trucks:

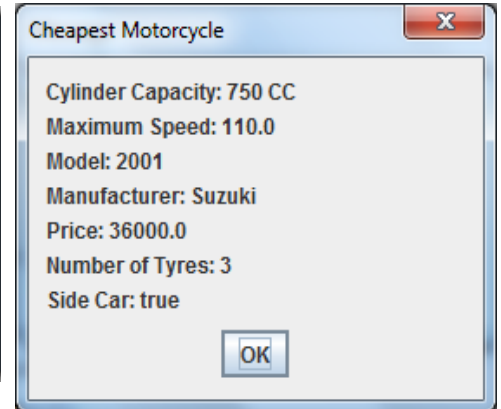
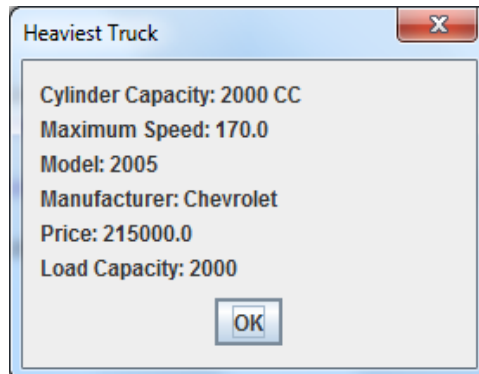
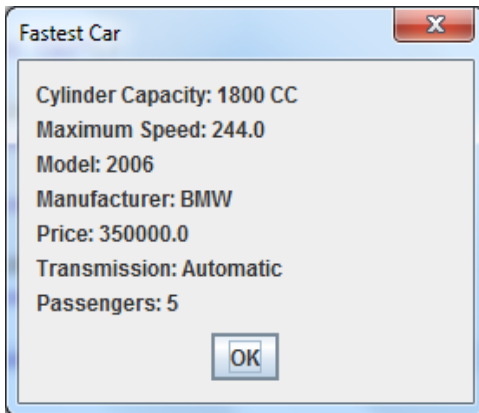
CC: 2000  
Speed: 170  
Model: 2005  
Manufacturer: **Chevrolet**  
Price: 215000  
Load: 2000

CC: 1800  
Speed: 150  
Model: 2007  
Manufacturer: **Daihatsu**  
Price: 172000  
Load: 1250

Motorcycles:

CC: 750  
Speed: 110  
Model: 2001  
Manufacturer: **Suzuki**  
Price: 36000  
Tyres: 3  
Side car: **true**

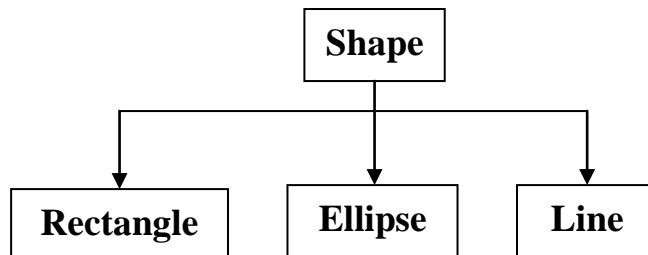
3. Compare and then print the information of the fastest car, heaviest truck and cheapest motorcycle, as the following.





**Question (2):**

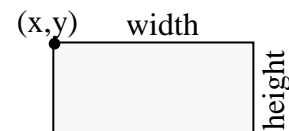
Consider the following class hierarchy:



- The superclass *Shape* is defined by two common attributes: **x** and **y**. This class has methods for setting and getting the values of these attributes.
- The subclasses *Rectangle*, *Ellipse* and *Line* inherit all attributes and methods of the superclass *Shape*.
- A *Rectangle* has two attributes: **width** and **height**. The class has methods for setting and getting the values of these attributes. The class also has a method that gets the area of the rectangle as well as a method that gets its perimeter.

$$Area = width \times height$$

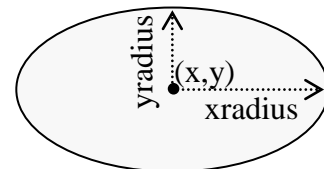
$$Perimeter = 2 \times (width + height)$$



- An *Ellipse* has two attributes: **xRadius** and **yRadius**. The class has methods for setting and getting the values of these attributes. The class also has a method that gets the area of the ellipse as well as a method that gets its circumference.

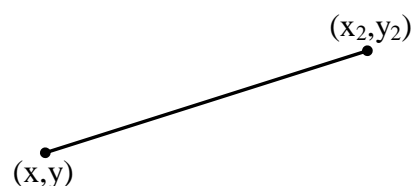
$$Area = \pi \times xRadius \times yRadius$$

$$Circumference = 2 \times \pi \times \sqrt{\frac{(xRadius)^2 + (yRadius)^2}{2}}$$



- A *Line* has two attributes: **x2** and **y2**. The class has methods for setting and getting the values of these attributes. The class also has a method that gets the length of the line.

$$Length = \sqrt{(x - x_2)^2 + (y - y_2)^2}$$



**In the main function, write a program to:**



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1. Create one Rectangle, one Ellipse, and one Line.
2. Set the attributes for each of the three shapes, using the shown data as an example:

<b>Rectangle</b>	<b>Ellipse</b>	<b>Line</b>
x: 15 y: 25 width: 15 height: 5	x: 5 y: 15 xRadius: 10 yRadius: 5	x: 15 y: 15 x2: 10 y2: 5

3. Print the information of the rectangle, ellipse, and line, as follows:

