

# Java Assignment 2.3: Creating Planets

1. Checkout the `CreatingPlanets` repository. It should contain this pdf and two classes: `Planet` and `PlanetTestDrive`.
2. First, the `Planet` class. It needs to have two private variables: `mass` and `radius`. Specify in comments that the units are in kilograms and meters. They do not need to be initialized.
3. Create methods to get and set the `mass` and the `radius`. Both setters (`setMass()` and `setRadius()`) should check that the input value is reasonable, and print out an error the value is not. You will have to make assumptions about what are reasonable masses and radii for planets and explain your logic in the comments (see me if you have questions). Remember to include the correct return types.
4. Next, the testing class `PlanetTestDrive`. In the main class, it should i) declare and initialize an object of the `Planet` class; ii) try to set the planet's mass and radius to invalid values iii) set them to valid values; iv) print those values out.
5. Next, create a method called `getSurfGrav()` in `Planet` that returns (not prints out) the surface gravity of the planet. The formula for surface gravity is:

$$g_{\text{planet}} = GM_{\text{planet}} / R_{\text{planet}}^2$$

where "G" is the gravitational constant,  $6.67 \times 10^{-11} \text{ m}^3/(\text{kg s}^2)$ , and  $M_{\text{planet}}$  and  $R_{\text{planet}}$  are the mass and radius of the planet, respectively. Note the square on the radius. This method should take no parameters. You can use the format `double foo = 1e-4` for scientific notation.

Remember, methods in a class can reference instance variables of the same class just by using their normal variable name. You do not need the dot operator when you are in the same class.

6. Print out the surface gravity of your `Planet` object in `PlanetTestDrive`.
7. Create another method called `getWeight()` in `Planet` that has one input parameter called `weightOnEarth`. This method should use an object's Earth weight and return its correct weight on this other planet. Your comments must specify the output units. The surface gravity on Earth is  $9.8 \text{ m/s}^2$ . What type does `weightOnEarth` have?
8. Finally, modify `PlanetTestDrive` so that it prints out a human being's Earth weight and weight on the other planet.

Bonus:

- Add a "generate random planet name" method.
- Create a new class `ExploreTheSolar` system, which has a method that gets the user's weight on Earth (through a `Scanner` object), then prints out their weight in various places of the solar system (e.g. Mars, the Moon, etc.)