BUILDING SECURITY SYSTEM
A large commercial building requires a security system. The building consists of several floors. Each floor has several rooms, and each room has one or more doors and several windows.

The system will monitor inputs from a number of sensors. There are different types of sensors such as smoke detectors, heat sensors, passive infra-red motion detectors, as well as door and window opening sensors.

The system will issue different alarms, such as audible alarms (buzzer, siren), flashing lights, console lights, in response to signalled events.

The basic sets for this assignment are **Names** and **Numbers**

Four new sets based on Numbers are introduced:

They are **Floors, Rooms, Sensors** and **Doors.** These sets are to be used in the questions that follow. Everything else must be defined or declared.

(Use the names that are shown in bold.)

1. Use set extension to define a set called **Sensortypes** and a set called **Alarms**
2. Each room has a particular designated **use**, such as Office, Toilet, Storeroom, etc. Write the declaration for the predicate **use.**
3. Each room will be **equipped** with a selection of different types of sensors. Write the declaration for a relation to model that.
4. Each room is **located** on a particular floor and each door **belongs** to a particular room. Write declarations for these fact types.
5. Specify that each individual sensor will be of a particular **type** and will be **positioned** in a particular room.
6. Specify that each sensor will **activate** a particular alarm and each sensor will set on its alarm for a particular **duration** (expressed in seconds).

Using declarations, express the following facts formally:

7. Room 103 is on Floor 1 and Room 201 is on Floor 2.
8. Rooms 309, 305 and 333 are all on Floor 3.
9. Room 101 is a toilet but it has no smoke detector.
10. Sensor number 78899 detects heat and is in Room 103

Specify the following sets using **set comprehension** and declarations already created:

11. All the window-opening sensors
12. All the doors in Room 101
13. All the window-opening and heat sensors
14. All the rooms that are on Floor 2
15. All the toilets that are on Floor 2
16. All the sensors that set off flashing lights
17. All the Smoke detectors that set of audible alarms
18. All the toilets that have window-opening sensors