1. The candidate keys for Schema 1 are student id and unit because a student takes more than one unit so the student id alone could not tell the user what grade a student got in each unit. For Schema 2, the candidate key is City as, in this exercise, cities are ‘globally’ unique and therefore there are no repeat cities in the database. This means the city alone is unique and the rest of the attributes can be identified from their respective cities. Whilst Country is repeated as there can be multiple cities in the database from one single country, such as France, and city and country populations can have the same number, city is not repeated.
2. In schema 1, the key attributes are studentid and unit. The non-attributes are name, gender and grade. For schema 2, the key attribute is city and non-key attributes are country, pop, co\_pop and capital.
3. Schema 1 takes the normal form 1NF each cell is atomic with no collected values in the attributes, entries in each column are of the same type. It does not, however, satisfy the second normal form, 2NF, as the non-key attributes gender and name functionally depend solely on studentid. Whilst grade does indeed rely on both candidate keys, because there are partial function dependencies it cannot be 2NF. Because schema 1 does not satisfy 2NF, it cannot support 3NF or BCNF as these normal forms are hierarchical.

We already know from looking at the table that this schema is at least 2NF because we can take the ‘shortcut’. Schema 2 is at least 1NF because cells are atomic but because there are no composite candidate keys, the schema is automatically at least 2NF. Going up the hierarchy though, the schema is not 3NF because there are transitive functional dependencies between country population (co\_pop) and country which is a non-key attribute in the schema. A country’s population depends on the country, thus violating the criteria for 3NF which does not allow for transitive dependencies between {country, co\_pop} which are non-key attributes. Because schema 2 does not satisfy 3NF, neither can it support BCNF.