

## Design Explanation (5 marks)

- Explain your design process and state any assumptions that you have made.

I've created a diagram which has Starlight Academy as the central entity which Student and Teacher entities have a relationship with. All members of each entity participate with the academy as that what defines them as students and teachers. Students then have relationships with Parent/Guardian and Emergency Contact, which partially overlap with one another, and each have their own key attribute. Students have numerous attributes with Student Number being its Key Attribute. Opposite to Student, Teachers have a teaching relationship with Starlight Academy with N:1. Their Key Attribute is Faculty ID, and some participate as Grade Coordinators as well. They have the Multivalued attribute of Grades Taught as teachers may teach multiple.

What decisions did you make and why?

Include the following information:

- Choose one entity type and describe why its key attribute is unique.  
Student Entity – This entity has the key attribute of Student Number which is a unique identifier for Students. This attribute is unique to each Student and so has not overlap.
- Choose one relationship and how it relates the participating entity types.  
Student to Emergency Contact Relationship – This relationship is defined as 1:1 in my diagram, as I assume each student requires a unique emergency contact. There may be cases where siblings would share a contact but given the importance of having an emergency contact, I've assumed that with the database this information will be duplicated minimally. I've also added a partial overlapping relationship with Emergency Contact and Parent/Guardian as in most cases the contact will be the guardian, but not always.
- Explain how at least one attribute can be derived from other attributes.  
Age is a derived attribute from the Date of Birth of Student, this is common in most databases of individuals since age is directly related to DOB, and by having it as a derived attribute it minimizes data overhead while minimizing the likelihood of error.

## Technical Criteria (20 marks total)

(16 marks) Your EER diagram must include at least 70% of the following components (i.e. Of the 22 numbered components below, at least 16 different types of components should be identifiable in your model).

### - Entities:

1. Entity Type(s)
  1. Student
  2. Parent/Guardian
  3. Teacher
2. Weak Entity Type(s)
  1. Emergency Contact

### - Relationships:

3. Relationship Type(s)
  1. Has (Emergency Contact)
  2. (Teacher) Teaches
  3. (Student) Attends
4. Identifying Relationship Type(s)
  1. (Parent) Responsible for

### - Attributes:

5. Simple Attribute(s)
  1. See Diagram
6. Key Attribute(s)
  1. Phone Number (Parent/Guardian)
  2. Student Number (Student)
  3. Phone Number (Emergency Contact)
  4. Faculty ID (Teacher)
7. Multivalued Attribute(s)
  1. Grades taught (Teacher)
8. Composite Attribute(s)
  1. Date of Birth [year, month, day] (Student)
9. Derived Attribute(s)
  1. Age (derived from Date of Birth)
10. Partial Key Attribute(s)

- Participation Constraints:

11. Total Participation(s)

1. Student must have total participation in relationship with Parent/Guardian and Emergency Contact, indicating these are mandatory for each student registered.
2. Student, Teacher must fully participate in relationship with Starlight Academy.

12. Partial Participation(s)

1. Teachers partially participate as Grade Coordinators

- Cardinality Constraints (not Min/Max notation):

13. 1:1 Cardinality(ies)

1. Student to Emergency Contact, each Student has 1 Emergency Contact.

14. 1:N Cardinality(ies)

1. Student to Parent/Guardian, each Student may have 1 or more Parents/Guardians

15. N:1 Cardinality(ies)

1. Student to Starlight Academy
2. Teacher to Starlight Academy

16. M:N Cardinality(ies)

- Specialization/Generalization (with constraints shown)

17. Disjoint & Total

1. Junior & Senior disjoint from Grade, all students are members of one or the other and they are mutually exclusive.

18. Disjoint & Partial

19. Overlapping & Total

20. Overlapping & Partial

Emergency Contact is partially overlapping with Parent/Guardian as many parents will also be the emergency contact but this relationship is not exclusive.

- Attribute Inheritance

21. Evidence that attributes are inherited, not duplicated

Diagram shows inheritance of attributes related to each entity.