Arkansas CTE

# Oracle - Database Fundamentals: Grades 10, 11, 12

Adopted 2006

## Introduction to Database Fundamentals

**1.1 Define terminology**

1. Prepare a list of terms with definitions 1.1.1

**1.2 Identify examples of jobs, salaries, and opportunities that could result from obtaining database certification**

1. Create a report from the occupational outlook handbook with examples of jobs, salaries, and opportunities that could result from obtaining database certification 1.2.1

**1.3 List at least three key facts about the importance of a post-secondary education**

1. Discuss with the class three key facts about the importance of a post-secondary education 1.3.1

**1.4 Discuss the history of computing**

1. Using the Internet, research and illustrate the history of computing 1.4.1

**1.5 Enumerate key points in the history of Oracle Corporation and its database technologies**

1. Identify key points in the history of Oracle Corporation and its database technologies 1.5.1

**1.6 Identify modern database applications used in everyday life**

1. Research and discuss modern database applications used in everyday life 1.6.1

**1.7 Describe the evolution of the database**

1. Create a timeline to show the evolution of a database 1.7.1

**1.8 Compare and contrast the concepts of data and information**

1. Discuss examples of data and information 1.8.1

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**1.9 Describe the database development process**

1. Identify the steps of the database development process `1.9.1`

**1.10 Identify specific areas of business that use database technology and explain how it is integral to their success**

1. Identify business areas that use database technology `1.10.1`
2. Explain how database technology is integral to business success `1.10.2`

**1.11 List the reasons for tracking and storing data**

1. Create a list of reasons for tracking and storing data `1.11.1`

**1.12 List the reasons for building a conceptual model**

1. Create a list of reasons for building a conceptual model `1.12.1`

**1.13 Compare and contrast logical and physical data models**

1. Discuss examples of logical and physical data models `1.13.1`

## Entities, Attributes, and Relationships

**2.1 Define terminology**

1. Prepare a list of terms with definitions `2.1.1`

**2.2 Compare and contrast entities and instances of entities**

1. Create sets of examples demonstrating differentiation of entities and instances of entities `2.2.1`

**2.3 Identify those aspects of a business about which data must be known when given a brief description of the business**

1. List the entities and attributes to be tracked about a business when given a written description of a business `2.3.1`

**2.4 Identify and describe attributes for a given entity**

1. Create a list of attributes for a given entity `2.4.1`

**2.5 Identify sample values for an attribute to support its inclusion in a data model**

1. Identify possible values for a given attribute and support the attributes inclusion in a data model `2.5.1`

**2.6 Compare the difference between an attribute and its value**

1. Categorize an item as either attribute or a value `2.6.1`

**2.7 Identify how to apply the rule that an attribute can have only one value at a given point in time**

1. Identify and explain violations of the rule that an attribute can have only one value at a given point in time `2.7.1`

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**2.8 Identify unique identifiers for a given entity**

1. Determine which of an entity's attributes can be selected as its unique identifier `2.8.1`

**2.9 Know the four goals of entity relationship modeling**

1. Identify the four goals of entity relationship modeling `2.9.1`

**2.10 Know the major types of databases**

1. List and discuss the major types of databases `2.10.1`

**2.11 Discuss and interpret relationship optionally**

1. Explain the meaning of a given ERD containing various optionality `2.11.1`

**2.12 Discuss and interpret relationship cardinality**

1. Explain the meaning of a given ERD containing various cardinality `2.12.1`

**2.13 Describe ER diagramming conventions**

1. Demonstrate ER diagramming conventions `2.13.1`

**2.14 List the ER diagramming conventions**

1. Create an ER diagram that represents entities, attributes, and relationships according to diagramming conventions `2.14.1`

**2.15 Identify relationships between pieces of data**

1. Articulate relationships between disparate pieces of data `2.15.1`

**2.16 Explain how to interpret and name entity relationships**

1. Construct sentences that explain the relationship between two entities in an ERD `2.16.1`

**2.17 Identify relationships using a matrix diagram**

1. Create a matrix diagram indicating the relationships in a business description `2.17.1`

**2.18 Identify key elements of source documents by identifying entities, attributes, and relationships**

1. List the entities, attributes, and relationships found in a business document `2.18.1`

**2.19 Describe a business represented by an entity relationship diagram**

1. Create a written description of a business represented by an entity relationship diagram `2.19.1`

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**) Explain an ERD based on an understanding of business needs**

1. Present and defend an entity relationship model based on an understanding of the described business needs 2.20.1

**2.21 Identify examples of supertypes and subtypes**

1. Demonstrate examples of supertypes and subtypes 2.21.1

**2.22 Discuss the rules relating to entities and subtypes**

1. List the rules relating to entities and subtypes 2.22.1

**2.23 Identify inaccuracies in an ERD including supertypes and subtypes**

1. Appraise the accuracy of an ERD including supertypes and subtypes 2.23.1

**2.24 Recall the rules of supertype and subtype and include them in a diagram**

1. Create a diagram including supertype/subtype modeling based on a written description of a business 2.24.1

**2.25 Compare and contrast structural and procedural business rules**

1. Create sets of examples demonstrating differentiation of structural and procedural business rules 2.25.1

**2.26 Discuss business rules that must be implemented through programming**

1. Create business rules that must be implemented through programming 2.26.1

**2.27 Identify business rules that can be represented in an ER model**

1. Create a diagram of business rules that can be represented in an ER model 2.27.1

**2.28 Describe and give an example of relationship nontransferability**

1. Identify unique attributes for a record that cannot be transferred 2.28.1

**2.29 Illustrate the use of a One-to-One relationship**

1. Design an ERD including a One-to-One relationship 2.29.1

**2.30 Illustrate the use of a One-to-Many relationship**

1. Design an ERD including a One-to-Many relationship 2.30.1

**2.31 Illustrate the use of a Many-to-Many relationship**

1. Design an ERD including a Many-to-Many relationship 2.31.1

**2.32 Identify a redundant relationship**

1. Identify a redundant relationship in an entity relationship diagram 2.32.1

**2.33 Describe the steps to resolve a Many-to-Many relationship using an intersection entity**

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1. Demonstrate the steps to resolve a Many-to-Many relationship using an intersection entity 2.33.1

**2.34 Explain the UID of an intersection entity and how to locate it in an ERD**

1. Identify the UID of an intersection entity and locate it in an ERD 2.34.1

**First, Second, and Third Normal Forms**

**3.1. Define terminology**

1. Prepare a list of terms with definitions 3.1.1

**3.2 Discuss the purpose of normalization in database models**

1. Illustrate the purpose of normalization in database models 3.2.1

**3.3 Explain the rule of first normal form**

1. Apply the rule of first normal form 3.3.1

**3.4 Identify violations of the rule of first normal form**

1. Analyze a non-normal entity and identify violations of the rule of first normal form 3.4.1

**3.5 Identify entities and relationships that fit the structure of an ERD based on context clues**

1. Analyze a partially completed ERD and identify entities and relationships that fit the structure 3.5.1

**3.6 Identify entities, attributes, and relationships in source documents**

1. Analyze a source document from a business and identify entities, attributes, and relationships 3.6.1

**3.7 Determine how to use meaning in source documents to create an ERD**

1. Create a conceptual model from a source document. 3.7.1

**3.8 Explain the rule of second normal form**

1. Demonstrate the rule of second normal form 3.8.1

**3.9 Describe violations of the rule of second normal form in a nonnormalized ERD**

1. Identify violations of the rule of second normal form in a nonnormalized ERD 3.9.1

**3.10 Discuss how to resolve violations of the rule of second normal form**

1. Apply the rule of second normal form to solve a violation in a data model 3.10.1

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**3.11 Discuss the selection of an artificial UID, a composite UID, or a secondary UID based on business needs**

1. Analyze business rules and justify the creation of an artificial UID, a composite UID, or a secondary UID 3.11.1

**3.12 Discuss transitive dependencies in a data model**

1. Identify transititve dependencies in a data model 3.12.1

**3.13 Explain the rules of third normal form**

1. Demonstrate the rule of third normal form 3.13.1

**3.14 Identify violations of the rule of third normal form in a nonnormalized ERD**

1. Identify violations of the rule of third normal form in a nonnormalized ERD 3.14.1

**3.15 Discuss how to resolve violations from the rule of third normal form**

1. Apply the rule of third normal form to solve a violation in the model 3.15.1

## Refining ERDs: Modeling Change Over Time

**4.1 Define terminology**

1. Prepare a list of terms with definitions 4.1.1

**4.2 Identify an exclusive OR relationship in a business scenario**

1. Analyze a given set of relationships and identify those which are mutually exclusive 4.2.1

**4.3 Illustrate the relationship between arcs and an exclusive OR relationship**

1. Create a diagram of an arc constraint to represent an exclusive OR relationship 4.3.1

**4.4 Distinguish between the use of an arc and a subtype in a data model**

1. Create an ERD using subtypes from an ERD written in arc form 4.4.1

**4.5 Identify an example of a hierarchical relationship**

1. Categorize a given relationship as hierarchical 4.5.1

**4.6 Explain how to diagram the UID relationships in a hierarchal model**

1. Create a diagram of the UID relationships in a hierarchical model 4.6.1

**4.7 Identify business examples of recursive relationships**

1. Create an ERD from a given business scenario involving recursive relationships 4.7.1

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**Compare and contrast hierarchical modeling and recursive modeling**

1. Create a model using both recursion and hierarchies to express the same conceptual meaning 4.8.1

**4.9 Identify the need to track data changes over time**

1. Justify the need to track changes over time 4.9.1

**4.10 Discuss how to model change over time**

1. Create ERD models that incorporate elements of data over time 4.10.1

**4.11 Explain the UID of an entity that stores historical data**

1. Identify the UID of an entity that stores historical data 4.11.1
2. Explain and justify the choice of UID 4.11.2

**4.12 Explain a data model to an audience**

1. Interpret and present a data model to an audience 4.12.1

**4.13 Identify required elements in written documentation that accompanies an ERD**

1. Create written documentation to accompany the oral presentation of an ERD 4.13.1

**4.14 Discuss the role of a consultant**

1. Summarize the role of a consultant 4.14.1

## Transforming from the Conceptual to the Physical

**5.1 Define terminology**

1. Prepare a list of terms with definitions 5.1.1

**5.2 Identify entity relationship models and database models**

1. Contrast entity relationship models and database models 5.2.1

**5.3 Compare and contrast the conceptual and physical data models**

1. Describe the terminology mapping between a conceptual model and a relational database model 5.3.1

**5.4 Discuss the rule of basic mapping to transform an entity into a table**

1. Apply the rule of basic mapping to transform an entity into a table 5.4.1

**5.5 Recall the rule of Oracle naming conventions for tables and columns used in relational models**

1. Apply the rule of Oracle naming conventions for tables and columns used in relational models 5.5.1

**5.6 Recall the rule of relationship mapping to correctly transform One-to-Many and barred relationships**

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1. Apply the rule of relationship mapping to correctly transform One-to-Many and barred relationship 5.6.1

**5.7 Recall the rule of relationship mapping to correctly transform Many-to-Many relationships**

1. Apply the rule of relationship mapping to correctly transform Many-to-Many relationships 5.7.1

**5.8 Recall the rule of relationship mapping to correctly transform One-to-One relationships**

1. Apply the rule of relationship mapping to correctly transform One-to-One relationships 5.8.1

**5.9 Recall the rule of relationship mapping to correctly transform relationships in an arc**

1. Apply the rule of relationship mapping to correctly transform relationships in an arc 5.9.1

**5.10 Recall the table, column, identifiers, relationship, and integrity constraint rules for mapping supertype implementations**

1. Apply and state the table, column, identifiers, relationship, and integrity constraint rules for mapping supertype implementations 5.10.1

**5.11 Recall the table, column, identifiers, relationship, and integrity constraint rules for mapping subtype implementations**

1. Apply and state the table, column, identifiers, relationship, and integrity constraint rules for mapping subtype implementations 5.11.1

**5.12 Recall the table, column, identifiers, relationship, and integrity constraint rules for mapping supertype and subtype arc implementations**

1. Apply and state the table, column, identifiers, relationship, and integrity constraint rules for mapping super and subtype arc implementations 5.12.1

**5.13 Discuss how to create a table in HTMLDB using a provided SQL script**

1. Demonstrate the process of entering a provided SQL script 5.13.1

**5.14 Describe how to enter sample data into an existing table using a provided SQL script**

1. Modify a given script to insert requested data into an existing table 5.14.1

**5.15 Explain how to query a table to view data using a provided SQL script**

1. Create a query to recall previously-entered information from a table using a provided SQL script 5.15.1



**Define terminology**

1. Prepare a list of terms with definitions 6.1.1

**6.2 Illustrate the Integrity rule as it relates to database tables**

1. Hypothesize why a given query that violates the integrity rule fails when run 6.2.1

**6.3 Discuss table, row, column, primary key, unique key, and foreign key**

1. Identify table, row, column, primary key, unique key, and foreign key given a diagram containing them 6.3.1

**6.4 Identify violations of data-integrity rules**

1. Correct violations of data-integrity rules 6.4.1

**6.5 Recall the rules of SQL to display all columns of a table**

1. Apply the rules of SQL to display all columns of a table 6.5.1

**6.6 Recall the rules of SQL to display a subset of the columns of a table specified by criteria**

1. Apply the rules of SQL to display a subset of the columns of a table specified by criteria 6.6.1

**6.7 Discuss how to add new data to a table containing four columns**

1. Apply the rules of SQL to add new data to a table containing four columns 6.7.1

**6.8 Discuss how to add a new column to an existing table**

1. Apply the rules of SQL to add a new column to an existing table 6.8.1

**6.9 Discuss the applications of DELETE and ALTER TABLE**

1. Apply the DELETE and ALTER TABLE commands to revise a table 6.9.1

**6.10 Identify a data-modeling project to solve a business information need**

1. Develop a business scenario to solve business information needs based on research 6.10.1

**6.11 Identify solutions to business problems using database technology**

1. Within groups, develop solutions to business problems using database 6.11.1

**6.12 Present a database solution to a business problem**

1. Create and present a database solution to a business problem 6.12.1

**6.13 Explain the different stages of the system development lifecycle**

1. List and describe the different stages of the system development lifecycle 6.13.1

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**4 Recall how to implement tables from an ERD**

1. Demonstrate the use of HTMLDB to implement tables from an ERD 6.14.1

**6.15 Recall how to issue SQL queries in HTMLDB**

1. Create a query output using HTMLDB 6.15.1

**6.16 Explain the features and benefits that Oracle Database Environment provides for businesses**

1. Discuss the features and benefits that Oracle Database Environment provides for businesses 6.16.1

**6.17 Compare and contrast application software and system software**

1. Identify key differences between application software and system software 6.17.1

**6.18 Identify the appropriate SOL functions to perform projection, selection and join**

1. Describe which sections of a SQL statement are responsible for projection, selection and join 6.18.1

**6.19 Discuss the correct syntax to perform arithmetic expressions on the columns of a query**

1. Demonstrate the correct syntax to perform arithmetic expressions on the columns of a query 6.19.1

**6.20 Recall correct operator precedence to display desired results**

1. Create queries using correct operator precedence to display desired results 6.20.1

**6.21 Compare and contrast the concepts of null, zero, and an empty string**

1. Categorize the concepts of null, zero, and an empty string 6.21.1

**6.22 Recall the effect null values have in arithmetic expressions**

1. Demonstrate the effect null values have in arithmetic expressions 6.22.1

**6.23 Identify when and how to use a column alias**

1. Construct a query using a column alias 6.23.1

**6.24 Recall how to use the concatenation operator**

1. Apply the concatenation operator to link column values and expressions to create a character expression 6.24.1

**6.25 Discuss the use of literal values of type character, number, and date**

1. Apply literal values of type character, number, and date in a SQL SELECT statement 6.25.1

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**6.26 Define and use DISTINCT to eliminate duplicates in query results**

1. Apply DISTINCT to eliminate duplicates in query results 6.26.1

**6.27 Display the structure of a table using DESCRIBE**

1. Create a query to display the structure of a table using DESCRIBE 6.27.1

**6.28 Illustrate the use of HTMLDB to run, edit, and save SQL statements**

1. Create a query to edit, execute, and save SQL statements in HTMLDB 6.28.1

**6.29 Know how to use WHERE clause to restrict rows returned in a SQL query**

1. Apply the WHERE clause to restrict rows returned in a SQL query 6.29.1

**6.30 Explain why it is important to be able to easily limit data retrieved from a table**

1. Justify the use of a WHERE clause used to limit data retrieved from a table 6.30.1

**6.31 Explain the use of logical comparisons to restrict the rows returned based on two or more conditions**

1. Evaluate logical comparisons to restrict the rows returned based on two or more conditions 6.31.1

**6.32 Explain the rules of precedence by which expressions are evaluated and calculated**

1. Apply the rules of precedence to determine the order in which expressions are evaluated and calculated 6.32.1

**6.33 Identify a query to sort a result set in ascending or descending order**

1. Construct a query to sort a result set in ascending or descending order 6.33.1

**6.34 Identify a query to order a result set using a column alias**

1. Construct a query to order a result set using a column alias 6.34.1

**6.35 Identify a query to order a result set for single or multiple columns**

1. Construct a query to order a result set for single or multiple columns 6.35.1

**6.36 Identify appropriate applications of single-row functions in query statements**

1. Create queries using single-row functions when given an appropriate business scenario 6.36.1

**6.37 Identify a function as a single row or multiple row function**

1. Categorize a function as a single row or multiple row function 6.37.1

**6.38 Compare and contrast the results returned by single row and multiple row functions**

1. Categorize the results returned by a function as single row or multiple row 6.38.1