SELF TEST

The following questions will help you measure your understanding of the material presented in this chapter. Read all the choices carefully because there might be more than one correct answer. Choose all the correct answers for each question.

The following test is typical of the questions and format of the OCA 12c examination for the topic “Retrieving Data Using the SQL SELECT Statement.” These questions often make use of the Human Resources schema.

List the Capabilities of SQL SELECT Statements

1. Which query creates a projection of the DEPARTMENT_NAME and LOCATION_ID columns from the DEPARTMENTS table? (Choose the best answer.)
   A. SELECT DISTINCT DEPARTMENT_NAME, LOCATION_ID
      FROM DEPARTMENTS;
   B. SELECT DEPARTMENT_NAME, LOCATION_ID
      FROM DEPARTMENTS;
   C. SELECT DEPT_NAME, LOC_ID
      FROM DEPT;
   D. SELECT DEPARTMENT_NAME AS "LOCATION_ID"
      FROM DEPARTMENTS;

2. After describing the EMPLOYEES table, you discover that the SALARY column has a data type of NUMBER(8,2). Which SALARY value(s) will not be permitted in this column? (Choose all that apply.)
   A. SALARY=12345678
   B. SALARY=123456.78
   C. SALARY=12345.678
   D. SALARY=123456
   E. SALARY=12.34

3. After describing the JOB_HISTORY table, you discover that the START_DATE and END_DATE columns have a data type of DATE. Consider the expression END_DATE-START_DATE. (Choose two correct statements.)
   A. A value of DATE data type is returned.
   B. A value of type NUMBER is returned.
   C. A value of type VARCHAR2 is returned.
   D. The expression is invalid since arithmetic cannot be performed on columns with DATE data types.
   E. The expression represents the days between the END_DATE and START_DATE less one day.
4. The DEPARTMENTS table contains a DEPARTMENT_NAME column with data type VARCHAR2(30). (Choose two true statements about this column.)
   A. This column can store character data up to a maximum of 30 characters.
   B. This column must store character data that is at least 30 characters long.
   C. The VARCHAR2 data type is replaced by the CHAR data type.
   D. This column can store data in a column with data type VARCHAR2(50) provided that the contents are at most 30 characters long.

Execute a Basic SELECT Statement

5. Which statement reports on unique JOB_ID values from the EMPLOYEES table? (Choose all that apply.)
   A. SELECT JOB_ID FROM EMPLOYEES;
   B. SELECT UNIQUE JOB_ID FROM EMPLOYEES;
   C. SELECT DISTINCT JOB_ID, EMPLOYEE_ID FROM EMPLOYEES;
   D. SELECT DISTINCT JOB_ID FROM EMPLOYEES;

6. Choose the two illegal statements. The two correct statements produce identical results. The two illegal statements will cause an error to be raised:
   A. SELECT DEPARTMENT_ID || ' represents the ' || DEPARTMENT_NAME || ' Department' as "Department Info"
      FROM DEPARTMENTS;
   B. SELECT DEPARTMENT_ID || ' represents the ' || DEPARTMENT_NAME || ' Department' as "Department Info"
      FROM DEPARTMENTS;
   C. SELECT department_id || ' represents the ' || department_name || ' Department' "Department Info"
      FROM departments;
   D. SELECT DEPARTMENT_ID represents the DEPARTMENT_NAME Department as "Department Info"
      FROM DEPARTMENTS;

7. Which expressions do not return NULL values? (Choose all that apply.)
   A. select ((10 + 20) * 50) + null from dual;
   B. select 'this is a ' || null || 'test with nulls' from dual;
   C. select null/0 from dual;
   D. select null || 'test' || null as "Test" from dual;
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8. Choose the correct syntax to return all columns and rows of data from the EMPLOYEES table.
   A. select all from employees;
   B. select employee_id, first_name, last_name, first_name, department_id from employees;
   C. select % from employees;
   D. select * from employees;
   E. select *.* from employees;

9. The following character literal expression is selected from the DUAL table:
   SELECT 'Coda's favorite fetch toy is his orange ring' FROM DUAL;
   (Choose the result that is returned.)
   A. An error would be returned due to the presence of two adjacent quotes
   B. Coda's favorite fetch toy is his orange ring
   C. Coda''s favorite fetch toy is his orange ring
   D. Coda''s favorite fetch toy is his orange ring'

10. There are four rows of data in the REGIONS table. Consider the following SQL statement:
    SELECT '6 * 6' "Area" FROM REGIONS;
    How many rows of results are returned and what value is returned by the Area column?
    (Choose the best answer.)
    A. 1 row returned, Area column contains value 36
    B. 4 rows returned, Area column contains value 36 for all 4 rows
    C. 1 row returned, Area column contains value 6 * 6
    D. 4 rows returned, Area column contains value 6 * 6 for all 4 rows
    E. A syntax error is returned.

LAB QUESTION

In this chapter you worked through examples in the Human Resources schema. Oracle provides a number of example schemas for you to experiment with and to learn different concepts from. For the practical exercises, you will be using the Order Entry, or OE, schema. The solutions for these exercises will be provided later using SQL Developer. Using SQL Developer or SQL*Plus, connect to the OE schema and complete the following tasks.

1. Obtain structural information for the PRODUCT_INFORMATION and ORDERS tables.
2. Select the unique SALES_REP_ID values from the ORDERS table. How many different sales representatives have been assigned to orders in the ORDERS table?
3. Create a results set based on the ORDERS table that includes the ORDER_ID, ORDER_DATE, and ORDER_TOTAL columns. Notice how the ORDER_DATE output is formatted differently from the START_DATE and END_DATE columns in the HR.JOB_HISTORY table.

4. The PRODUCT_INFORMATION table stores data regarding the products available for sale in a fictitious IT hardware store. Produce a set of results that will be useful for a salesperson. Extract product information in the format <PRODUCT_NAME> with code: <PRODUCT_ID> has status of: <PRODUCT_STATUS>. Alias the expression as “Product.” The results should provide the LIST_PRICE, the MIN_PRICE, the difference between LIST_PRICE, and MIN_PRICE aliased as “Max Actual Savings”, along with an additional expression that takes the difference between LIST_PRICE and MIN_PRICE and divides it by the LIST_PRICE and then multiplies the total by 100. This last expression should be aliased as “Max Discount %”.

5. Calculate the surface area of the earth using the DUAL table. Alias this expression as “Earth’s Area”. The formula for calculating the area of a sphere is: $4\pi r^2$. Assume, for this example, that the earth is a simple sphere with a radius of 3,958.759 miles and that $\pi$ is 22/7.
SELF TEST ANSWERS

List the Capabilities of SQL SELECT Statements

1. ☑ B. A projection is an intentional restriction of the columns returned from a table. 
   ☒ A, C, and D are incorrect. A is eliminated since the question has nothing to do with 
   duplicates, distinctiveness, or uniqueness of data. C incorrectly selects nonexistent columns 
   called DEPT_NAME and LOC_ID from a nonexistent table called DEPT. D returns just 
   one of the requested columns: DEPARTMENT_NAME. Instead of additionally projecting 
   the LOCATION_ID column from the DEPARTMENTS table, it attempts to alias the 
   DEPARTMENT_NAME column as LOCATION_ID.

2. ☑ A. Columns with NUMBER(8,2) data type can store, at most, eight digits, of which, at 
   most, six digits are to the left of the decimal point. Although A is the correct answer, note that 
   since the question is phrased in the negative, these values are NOT allowed to be stored in such 
   a column. A is not allowed because it contains eight whole number digits, but the data type is 
   constrained to store six whole number digits and two fractional digits. 
   ☒ B, C, D, and E are incorrect, as they can legitimately be stored in this data type. C is 
   allowed since the fractional portion is rounded to two decimal places. D shows that numbers 
   with no fractional part are legitimate values for this column, as long as the number of digits in 
   the whole number portion does not exceed six digits.

3. ☑ B and E. The result of arithmetic between two date values represents a certain number of 
   days. 
   ☒ A, C, and D are incorrect. It is a common mistake to expect the result of arithmetic 
   between two date values to be a date as well, so A may seem plausible, but it is false.

4. ☑ A and D. The scale of the VARCHAR2 data type, specified in brackets, determines its 
   maximum capacity for storing character data as mentioned by A. If a data value that is at most 
   30 characters long is stored in any data type, it can also be stored in this column as stated by D. 
   ☒ B and C are incorrect. B is incorrect because it is possible to store character data of any 
   length up to 30 characters in this column. C is false, since the CHAR data type exists in parallel 
   with the VARCHAR2 data type.

Execute a Basic SELECT Statement

5. ☑ D. Unique JOB_ID values are projected from the EMPLOYEES table by applying the 
   DISTINCT keyword to just the JOB_ID column. 
   ☒ A, B, and C are incorrect, since A returns an unrestricted list of JOB_ID values including 
   duplicates, B makes use of the UNIQUE keyword in the incorrect context, and C selects the 
   distinct combination of JOB_ID and EMPLOYEE_ID values. This has the effect of returning
all the rows from the EMPLOYEES table since the EMPLOYEE_ID column contains unique values for each employee record. Additionally, C returns two columns, which is not what was originally requested.

6. ☑️ B and D. B and D represent the two illegal statements that will return syntax errors if they are executed. This is a tricky question because it asks for the illegal statements and not the legal statements. B is illegal because it is missing a single quote enclosing the character literal "represents the". D is illegal because it does not make use of single quotes to enclose its character literals.

☒ A and C are incorrect, as they are the legal statements. A and C appear to be different since the case of the SQL statements are different and A uses the alias keyword AS, whereas C just leaves a space between the expression and the alias. Yet both A and C produce identical results.

7. ☑️ B and D. B and D do not return null values since character expressions are not affected in the same way by null values as arithmetic expressions. B and D ignore the presence of null values in their expressions and return the remaining character literals.

☒ A and C are incorrect. They return null values because any arithmetic expression that involves a null will return a null.

8. ☑️ D. An asterisk is the SQL operator that implies that all columns must be selected from a table.

☒ A, B, C, and E are incorrect. A uses the ALL reserved word but is missing any column specification and will, therefore, generate an error. B selects some columns but not all columns and, therefore, does not answer the question. C and E make use of illegal selection operators.

9. ☑️ B. The key to identifying the correct result lies in understanding the role of the single quotation marks. The entire literal is enclosed by a pair of quotes to avoid the generation of an error. The two adjacent quotes are necessary to delimit the single quote that appears in literal B.

☒ A, C, and D are incorrect. A is eliminated since no error is returned. C inaccurately returns two adjacent quotes in the literal expression and D returns a literal with all the quotes still present. The Oracle server removes the quotes used as character delimiters after processing the literal.

10. ☑️ D. The literal expression '6 * 6' is selected once for each row of data in the REGIONS table.

☒ A, B, C, and E are incorrect. A returns one row instead of four and calculates the product 6 * 6. The enclosing quote operators render 6 * 6 a character literal and not a numeric literal that can be calculated. B correctly returns four rows but incorrectly evaluates the character literal as a numeric literal. C incorrectly returns one row instead of four and E is incorrect, because the given SQL statement can be executed.
LAB ANSWER

The assumption is made that an Oracle database is available for you to practice on. The database administrator (DBA) in your organization may assist you with installing and setting this up. In order for any client tool such as SQL*Plus or SQL Developer to connect to the database, a listener process should be running and the database must be opened. Additionally, you may have to request that the HR and OE schema accounts be unlocked and that the passwords be reset. If these sample schemas are not present, it is a simple matter to get the DBA to run the scripts, which are installed when the database is installed, to create them. Connect to the OE schema using either SQL*Plus or SQL Developer.

1. The DESCRIBE command gives us the structural description of a table. The following illustration shows these two tables being described:
2. The request for unique values usually involves using the DISTINCT keyword as part of your SELECT statement. The two components of the statement involve the SELECT clause and the FROM clause. You were asked for unique SALES_REP_ID values FROM the ORDERS table. It is simple to translate this request into the following SELECT statement:

```sql
SELECT DISTINCT sales_rep_id
FROM orders;
```

From the results in the illustration, you can answer the original question: There are nine different sales representatives responsible for orders listed in the ORDERS table, but there is at least one order that contains null values in their SALES_REP_ID fields.

3. When asked to create a results set, it translates to SELECT one or more columns from a table. In this case, your SELECT clause is constructed from the three columns requested. There is no
request for unique values, so there is no need to consider the DISTINCT keyword. The FROM clause need only include the ORDERS table to build the following SELECT statement:

```sql
SELECT order_id, order_date, order_total
FROM orders;
```

Consider the output in the following illustration, specifically the ORDER_DATE column. This column contains the day, month, year, hours, minutes, seconds, and fractional seconds up to six decimal places or accurate up to a millionth of a second. The description of the ORDERS table exposes ORDER_DATE as a TIMESTAMP(6) with LOCAL TIMEZONE column. This means that the data in this column can be stored with fractional precision up to six decimal places and that the data is time zone-aware. Basically, data may be worked on by people in different time zones. So Oracle provides a data type that normalizes the local time to the database time zone to avoid confusion. Compared to the START_DATE and END_DATE columns in the HR.JOB_HISTORY table, the ORDER_DATE column data type is far more sophisticated. Essentially, though, both these data types store date and time information but to differing degrees of precision.
4. The SELECT clause to answer this question should contain an expression aliased as “Product” made up of concatenations of character literals with the PRODUCT_NAME, PRODUCT_ID, and PRODUCT_STATUS columns. Additionally, the SELECT clause must contain the LIST_PRICE and MIN_PRICE columns and two further arithmetic expressions aliased as “Max Actual Savings” and “Max Discount %”. The FROM clause need only include the PRODUCT_INFORMATION table. Proceed by constructing each of the three expressions in turn and put them all together. The “Product” expression could be derived with the following SELECT statement:

```
SELECT product_name || ' with code: ' || product_id || ' has status of: ' || product_status AS "Product"
```

The “Max Actual Savings” expression could be derived with the following SELECT statement:

```
SELECT list_price - min_price AS "Max Actual Savings"
```

The “Max Discount %” expression takes the calculation for “Max Actual Savings”, divides this amount by the LIST_PRICE, and multiplies it by 100. It could be derived with the following SELECT statement:

```
SELECT ((list_price - min_price) / list_price) * 100 AS "Max Discount %"
```
These three expressions, along with the two regular columns, form the SELECT clause executed against the PRODUCT_INFORMATION table as shown next:

5. The versatile DUAL table clearly forms the FROM clause. The SELECT clause is more interesting, since no actual columns are being selected, just an arithmetic expression. A possible SELECT statement to derive this calculation could be:

```
SELECT (4 * (22/7) * (3958.759 * 3958.759)) AS "Earth's Area"
FROM dual;
```

This calculation approximates that planet Earth's surface area is 197,016,573 square miles.