

# Oracle Academy

## Database Programming with SQL

### Instructor Resource Guide

#### INSTRUCTOR NOTES

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#### SECTION 2 LESSON 1 – Conversion Functions

##### Slide 1: Conversion Functions

###### *What to Watch For*

This is a lesson that requires considerable student practice. Check to make sure that, when students get output returned from a query, it is the correct output. Relate the idea of presenting information in a more-readable format to the process of preparing the data-modeling presentation for the clients. It was important to have the information in a format that was easily understood by everyone.

###### *Connections*

Ask students to find examples of formatted data on the Internet or in the newspaper. Sources include the financial page, statistical information, grade reports, etc. Ask them to write a SQL statement to convert default format to the source format. Have students present their findings to the class.

##### Slide 2: What Will I Learn? — Objectives

No instructor notes for this slide

##### Slide 3: Why Learn It? — Purpose

Ask students: How do you choose a book to read or buy? Does the cover help you make a decision? What if you open the book and there are no pictures and the type is very small? Are you still interested?

Why do CDs and video tapes have colorful, interesting labels? Have you ever bought a new candy bar because the wrapper attracted your attention?

The way we design and format information can make a big difference in how we receive and interpret the information.

##### Slide 4: Tell Me / Show Me –Data Types

Before beginning this lesson's discussion of datatype conversions and the Oracle Server's capability to implicitly do datatype conversions, explain to students the difference between "implicit" and "explicit." Use the example, "When she rolled her eyes and sighed, Sue implicitly told Bill she didn't want to go the dance with him. Bill didn't understand her actions until she explicitly said, 'Bill, I already told you, I have a date for the dance!'" The dictionary defines "implicit" as something that is "implied but not directly expressed" and explicit as "clearly formulated or defined."

Students may not be familiar with concept of datatypes. Explain that most programming languages require the programmer to declare the datatype of every data object. For the data stored in a database, the SQL programmer defines a datatype for every column in the

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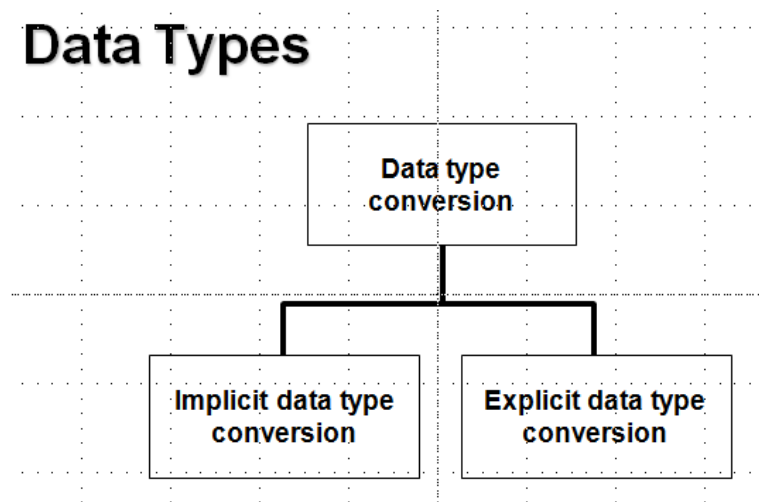
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database. Explain that later in the course, they will learn more about SQL datatypes, but for now they will be using VARCHAR2, CHAR, NUMBER, and DATE.

*Slide 5: Tell Me / Show Me – Data Types Describeds*

In this lesson, students will explicitly define datatype conversions to ensure the reliability of SQL statements.

*Slide 6: Tell Me / Show Me – Type Conversion*



### Implicit Data Type Conversion

For assignments, the Oracle server can automatically convert the following:

FROM	TO
VARCHAR2 or CHAR	NUMBER
VARCHAR2 or CHAR	DATE
NUMBER	VARCHAR2
DATE	VARCHAR2

*Slide 7: Tell Me / Show Me – Date Conversion to Character Data*

No instructor notes for this slide

*Slide 8: Tell Me / Show Me – Date Conversion to Character Data (continued)*

No instructor notes for this slide

*Slide 9: Tell Me / Show Me – Date Conversion to Character Data (continued)*

After introducing each of the four datatype conversions, explain the format model table and the use of “fm” and “spth.” STOP and allow students time to practice. `SELECT id, TO_CHAR(event_date, 'MONTH DD, YYYY') FROM d_events;` returns:

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100 MAY 14, 2004  
105 APRIL 28, 2004

#### Slide 10: Tell Me / Show Me – Date and Time Format Models

After introducing each of the four datatype conversions, explain the format model table and the use of “fm” and “th.” STOP and allow students time to practice.

**Conversion answers:** (The date will vary depending on the SYSDATE.)

```
SELECT TO_CHAR(SYSDATE, 'fmMonth ddth, YYYY' ) FROM DUAL;
```

Returns the format: August 6th, 2004

```
SELECT TO_CHAR(SYSDATE, 'Month dd, YYYY' ) FROM DUAL;
```

Returns the format: August 06, 2004

```
SELECT TO_CHAR(SYSDATE, 'fmMON dd, YYYY' ) FROM DUAL;
```

returns: AUG 6, 2004

```
SELECT TO_CHAR(SYSDATE, 'fmMonth ddth, Day, YYYY' ) FROM DUAL;
```

Returns the format: August 6th, Friday, 2004

#### Slide 11: Tell Me / Show Me – Number Conversion to Character Data (VARCHAR2)

No instructor notes for this slide

#### Slide 12: Tell Me / Show Me – Number Conversion to Character Data (VARCHAR2) (continued)

No instructor notes for this slide

#### Slide 13: Tell Me / Show Me – Number Conversion to Character Data (VARCHAR2) (continued)

**Conversion answers:**

```
$3000.00 TO_CHAR(salary, '$9999.99')
```

```
4,500 TO_CHAR(salary, '9,999')
```

```
9,000.00 TO_CHAR(salary, '9,999.99')
```

```
0004422 TO_CHAR(salary, '0009999')
```

#### Slide 14: Tell Me / Show Me – Character Conversion to Number

Ask students to use the DUAL table to convert their age to a number.

#### Slide 15: Tell Me / Show Me – Character Conversion to Number (continued)

Ask students to use the DUAL table to convert their age to a number.

#### Slide 16: Tell Me / Show Me – Character Conversion to Date

No instructor notes for this slide

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#### Slide 17: Tell Me / Show Me – Character Conversion to Date (continued)

The fx format may require more practice. Remind students to think of fx as “format exact” so the fxdate of the format model must exactly match the format of the date being converted.

Ask students to use the fx modifier to convert each of the following to the default date format.

June19 2004

```
SELECT TO_DATE('June19 2004', 'fxMonthDD RRRR') AS Convert  
FROM DUAL;
```

July312004

```
SELECT TO_DATE('July312004', 'fxMonthDDRRRR') AS Convert  
FROM DUAL;
```

Using the DUAL table, ask students to format their birthday in five different ways. Remind students that they will first have to convert their “character” data to date data and then format it. If they were using a DATE datatype column from a table such as hire\_date, the conversion TO\_DATE before formatting would not be necessary.

```
SELECT TO_CHAR(TO_DATE('June 19, 1990','Month dd, YYYY'),'MON DD YYYY')  
AS Birthday  
FROM DUAL;
```

#### Slide 18: Tell Me / Show Me –fx Modifier Rules

No instructor notes for this slide

#### Slide 19: Tell Me / Show Me – RR Date Format and YY Date Format

No instructor notes for this slide

#### Slide 20: Tell Me / Show Me – A Few Simple Rules

No instructor notes for this slide

#### Slide 21: Tell Me / Show Me – A Few Simple Rules (continued)

No instructor notes for this slide

#### Slide 22: Tell Me / Show Me – A Few Simple Rules (continued)

Use the following example to show the effects of the RRRR and YYYY formats:

```
SELECT last_name, TO_CHAR(hire_date, 'DD-Mon-YYYY')  
FROM employees  
WHERE hire_date < TO_DATE('01-Jan-90', 'DD-Mon-RR');
```

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You'll get about three rows. Examine the WHERE clause. It asks to return only those hire dates less than (before) those of 01-Jan-90. The RR used in the format model here makes sure that the date is seen as 01-Jan-90. The three rows returned were those few people who were hired before 01-Jan-90.

Reformat the query:

```
SELECT last_name, TO_CHAR(hire_date, 'DD-Mon-YYYY')
FROM employees
WHERE hire_date < TO_DATE('01-Jan-90', 'DD-Mon-YY');
```

Now 20 rows were returned. Again, examine the format model in the WHERE clause. Using the YY format causes the date to default to the current century, and since we are in the 2000s, 01-JAN-90 is seen as 01-JAN-2090. Everyone was hired before that date, right? Ask students to research the “Millennium Bug” or “Y2K” and the concern people had about how databases recorded their information.

Expect students to be a bit confused learning the RR and YY formats. Emphasize that the problem exists when character data such as 01-Jan-90 is being formatted into a default date format. Instead of using RR in the format model, YY is used. Because we are in the 21st century, the YY is interpreted in the current century as 2090. Provide additional practice by choosing a random date in either the 20th or 21st century, and ask students to provide the correct result.

#### Slide 23: Tell Me / Show Me – Terminology

**CHAR:** Used for text and character data of fixed length, including numbers, dashes, and special characters.

**Fm:** Used to remove padded blanks or to suppress leading zeros

Conversion function-Functions that convert a value from one datatype to another.

**NUMBER:** Used to store variable-length numeric data.

**VARCHAR2:** Used for character data of variable length, including numbers, special characters, and dashes.

**DATE:** Used for date and time values.

**TO\_CHAR:** Converts dates or numbers to character strings with optional formatting

**RR date format:** Century value depends on the specified year and the last two digits of the current year

**TO\_NUMBER:** Converts a character string containing digits to a number with optional formatting

**DD date format:** Numeric day of the month

**TO\_DATE:** Converts a character string representing a date to a date value with optional formatting

**Conversion Function:** A set of functions used to format stored data in a user-friendly, readable manner.

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Slide 24: Summary – Objectives Summarized

No instructor notes for this slide

Slide 25: Summary – Practice Guide

No instructor notes for this slide

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#### SECTION 2 LESSON 2 – NULL Functions

##### Slide 1: NULL Functions

###### *What to Watch For*

Students may be suffering from “information overload” at this point. Keep encouraging practice. Ask students to generate query examples and challenge the class.

###### *Connections*

Many of the functions students learned in this lesson, they do every day.

Ask: Have you ever gone to a store to buy a something you were looking for only to find out that the store didn't have it? Have you been in the lunch line only to find out that your favorite item was sold out? Did you choose something else? If you've ever had this experience, you actually were doing a NVL2 or COALESCE function. If the first choice was null, choose the second or the third.

A lot of the power of SQL is to emulate decisions that we need to make every day. We need the date format changed to comply with how another country writes it. We need to issue payroll checks that have currency signs instead of just numbers.

Ask students to draw parallels between the functions and syntax they are learning and why the function was developed in the first place. After all, if no one ever needed to give a column another name in a report, would aliases ever have been developed?

##### Slide 2: What Will I Learn? – Objectives

No instructor notes for this slide

##### Slide 3: Why Learn It? – Purpose

No instructor notes for this slide

##### Slide 4: Tell Me / Show Me – How Functions are Evaluated

No instructor notes for this slide

##### Slide 5: Tell Me / Show Me – How Functions are Evaluated (continued)

Students should be familiar with nested functions taught in mathematics. In the example, ask students to list the order of processing.

Step 1: The hire date is going to have six months added to it.

Step 2: The first Friday following the future day will be identified.

Step 3: The default date format will be formatted to read and display the Friday in a format similar to: Friday, December 18TH, 1987, and will appear in the output under the column name “Next Evaluation.”

##### Slide 6: Tell Me / Show Me – Functions Pertaining to Null Values

No instructor notes for this slide

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Slide 7: Tell Me / Show Me – NVL Function

No instructor notes for this slide

Slide 8: Tell Me / Show Me – NVL Function (continued)

No instructor notes for this slide

Slide 9: Tell Me / Show Me – NVL functions (continued)

No instructor notes for this slide

Slide 10: Tell Me / Show Me – NVL Function (continued)

No instructor notes for this slide

Slide 11: Tell Me / Show Me – NVL2 Function

Students have not formally studied datatypes. Tell them that LONG is variable-length character data up to 2 gigabytes in size.

Slide 12: Tell Me / Show Me – NVL2 Function (continued)

The NVL2 sample code illustrates a SQL statement returning an employee's salary and income. For employees who work on commission, the income is equivalent to the salary plus the salary multiplied by the commission percentage. For those who do not work on commission, the income is equivalent to the salary.

```
SELECT last_name, salary, NVL2(commission_pct, salary + (salary * commission_pct),  
salary) income  
FROM employees;
```

Slide 13: Tell Me / Show Me – NULLIF Function

In the example NULLIF compares the length of a partner's first name with the length of the same partner's last name, and if they are the same length then returns NULL and if they are different, then it returns the value of the first expression, in this case, first name. NULLIF are often used after doing data migration projects to test if the data in the target system is the same as in the original source systems. So NULLIF is used to look for exceptions not matches – normally nulls as a result from NULLIF is good, as you would want the data in the source and target systems to be exactly the same.

Slide 14: Tell Me / Show Me – COALESCE Function

No instructor notes for this slide

Slide 15: Tell Me / Show Me – COALESCE Function (continued)

No instructor notes for this slide

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Slide 16: Tell Me / Show Me – Terminology

**NVL:** Converts nulls to an actual value

**COALESCE:** Returns the first non-null expression in the list

**NVL2:** Examines the first expression; if the first expression is not null, it returns the second expression; if the first expression is null, it returns the third expression

**NULLIF:** Compares two expressions; if they are equal, the function returns null; if they are not equal, the function returns the first expression

Slide 17: Summary – Objectives Summarized

No instructor notes for this slide

Slide 18: Summary – Practice Guide

No instructor notes for this slide

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#### SECTION 2 LESSON 3 – Conditional Expressions

##### Slide 1: Conditional Expressions

###### *What to Watch For*

The CASE and DECODE functions need practice. Remind students to think of these functions as IF-THEN-ELSE decision operations. Read the syntax to them in this way.

###### *Connections*

Other programming languages use similar IF-ELSE or IF-THEN-ELSE processes. Understanding their function and use will make learning other programming languages easier.

##### Slide 2: What Will I Learn? – Objectives

No instructor notes for this slide

##### Slide 3: Why Learn It? – Purpose

No instructor notes for this slide

##### Slide 4: Why Learn It? – Purpose (continued)

No instructor notes for this slide

##### Slide 5: Tell Me / Show Me – Conditional Expressions

No instructor notes for this slide

##### Slide 6: Tell Me / Show Me – CASE Syntax

No instructor notes for this slide

##### Slide 7: Tell Me / Show Me – DECODE Expression

Students may have difficulty distinguishing between CASE and DECODE. The CASE expression is a more flexible version of the DECODE function. The CASE expression complies with ANSI SQL; DECODE is specific to Oracle syntax.

##### Slide 8: Tell Me / Show Me – DECODE Expression (continued)

No instructor notes for this slide

##### Slide 9: Tell Me / Show Me – Terminology

**DECODE:** Compares an expression to each of the search values

**Conditional expression:** An if-then-else expression whose value depends on the truth-value of a Boolean expression.

**CASE:** Implements conditional processing within a SQL statement; it meets the ANSI standard

##### Slide 10: Summary – In this lesson you have learned to:

No instructor notes for this slide

##### Slide 11: Summary – Practice Guide

No instructor notes for this slide

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#### PRACTICE SOLUTIONS

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#### SECTION 2 LESSON 1 – Conversion Functions

##### Vocabulary

Directions: Identify the vocabulary word for each definition below.

<u>CHAR</u>	Used for text and character data of fixed length, including numbers, dashes, and special characters.
<u>fm</u>	Used to remove padded blanks or to suppress leading zeros
<u>Conversion function</u>	Functions that convert a value from one datatype to another.
<u>NUMBER</u>	Used to store variable-length numeric data.
<u>VARCHAR2</u>	Used for character data of variable length, including numbers, special characters, and dashes.
<u>DATE</u>	Used for date and time values.
<u>TO_CHAR</u>	Converts dates or numbers to character strings with optional formatting
<u>RR date format</u>	Century value depends on the specified year and the last two digits of the current year
<u>TO_NUMBER</u>	Converts a character string containing digits to a number with optional formatting
<u>DD date format</u>	Numeric day of the month
<u>TO_DATE</u>	Converts a character string representing a date to a date value with optional formatting

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#### Try It / Solve It

In each of the following exercises, feel free to use labels for the converted column to make the output more readable.

1. List the last names and birthdays of Global Fast Food Employees. Convert the birth dates to character data in the Month DD, YYYY format. Suppress any leading zeros.

**Solution:**

```
SELECT last_name, TO_CHAR(birthdate, 'Month fmDD, RRRR') AS "Birthday"  
FROM f_staffs;
```

2. Convert January 3, 2004, to the default date format 03-JAN-04.

**Solution:**

```
SELECT TO_DATE('January 3, 2004', 'Month dd, YYYY') AS "Date"  
FROM DUAL;
```

3. Format a query from the Global Fast Foods f\_promotional\_menus table to print out the start\_date of promotional code 110 as: The promotion began on the tenth of February 2004.

**Solution:**

```
SELECT 'The promotion began on the ' || TO_CHAR(start_date, 'ddspth "of" Month  
YYYY') AS "Date"  
FROM f_promotional_menus  
WHERE code = 110;
```

4. Convert today's date to a format such as: "Today is the Twentieth of March, Two Thousand Four"

**Solution:**

```
SELECT 'Today is the ' || TO_CHAR(SYSDATE, 'Ddspth "of" Month, Yyyysp')  
FROM DUAL;
```

5. List the ID, name and salary for all Global Fast Foods employees. Display salary with a \$ sign and two decimal places.

**Solution:**

```
SELECT id, first_name, TO_CHAR(salary, '$999.99')  
FROM f_staffs;
```

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6. Ellen Abel is an employee who has received a \$2,000 raise. Display her first name and last name, her current salary, and her new salary. Display both salaries with a \$ and two decimal places. Label her new salary column AS New Salary.

**Solution:**

```
SELECT first_name, last_name, TO_CHAR(salary, '$99,999.99') AS "Current  
Salary", TO_CHAR(salary + 2000, '$99,999.99') AS "New Salary"  
FROM EMPLOYEES  
WHERE last_name='Abel ';
```

7. On what day of the week and date did Global Fast Foods' promotional code 110 Valentine's Special begin?

**Solution:**

```
SELECT TO_CHAR(start_date, 'Day Month ddth') AS "Valentine's"  
FROM f_promotional_menus  
WHERE code = 110;
```

8. Create one query that will convert 25-DEC-04 into each of the following (you will have to convert 25-DEC-04 to a date and then to character data):

```
December 25th, 2004  
DECEMBER 25TH, 2004  
25th december, 2004
```

**Solution:**

```
SELECT TO_CHAR(TO_DATE('25-DEC-04','dd-MON-yy'),'Month ddth,  
YYYY')Convert,TO_CHAR(TO_DATE('25-DEC-04','dd-MON-yy'),'MONTH DDth,  
YYYY')Convert,TO_CHAR(TO_DATE('25-DEC-04','dd-MON-yy'),'month ddth,  
YYYY') AS Convert  
FROM DUAL;
```

9. Create a query that will format the DJ on Demand d\_packages columns, low-range and high-range package costs, in the format \$2500.00.

**Solution:**

```
SELECT TO_CHAR(low_range, '$99999.99')AS LOW, TO_CHAR(high_range,  
'$99999.99') AS HIGH  
FROM d_packages;
```

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10. Convert JUNE192004 to a date using the fx format model.

**Solution:**

```
SELECT TO_DATE('JUNE192004','fxMONTHDDYYYY') AS BIRTHDAY  
FROM DUAL;
```

A common error when formatting dates is to omit the single quotation mark. The error message is missing a right parenthesis.

11. What is the distinction between implicit and explicit datatype conversion? Give an example of each.

**Solution:**

Implicit datatype conversion occurs when the Oracle server internally converts datatypes for example, Varchar2 to number. Explicit data conversion is when the specific function is used to convert one datatype to another, for example: TO\_DATE (actual examples may vary).

12. Why is it important from a business perspective to have datatype conversions?

**Solution:**

Datatype conversions offer the facility to display numbers as local currency, format dates in a variety of formats, display time to the second, and keep track of what century a date refers to.

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#### SECTION 2 LESSON 2 – NULL Functions

##### Vocabulary

Directions: Identify the vocabulary word for each definition below.

<u>NVL</u>	Converts nulls to an actual value
<u>COALESCE</u>	Returns the first non-null expression in the list
<u>NVL2</u>	Examines the first expression; if the first expression is not null, it returns the second expression; if the first expression is null, it returns the third expression
<u>NULLIF</u>	Compares two expressions; if they are equal, the function returns null; if they are not equal, the function returns the first expression

##### Try It / Solve It

Encourage the students to use aliases to make the output more readable.

1. Create a report that shows the Global Fast Foods promotional name, start date and end date from the f\_promotional\_menus table. If there is an end date, temporarily replace it with “end in two weeks.” If there is no end date, replace it with today’s date.

**Solution:**

```
SELECT name, NVL2(end_date,'end in two weeks', SYSDATE)AS Promotion
FROM f_promotional_menus;
```

2. Not all Global Fast Foods staff members receive overtime pay. Instead of displaying a null value for these employees, replace null with zero. Include the employee’s last name and overtime rate in the output. Label the overtime rate as “Overtime Status.”

**Solution:**

```
SELECT last_name,NVL(overtime_rate,0) AS "Overtime Status"
FROM f_staffs;
```

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3. The manager of Global Fast Foods has decided to give all staff that currently does not earn overtime an overtime rate of \$5.00. Construct a query that displays last names and overtime rate shown as \$5.00.

**Solution:**

```
SELECT last_name, TO_CHAR(NVL(overtime_rate,5.00), '$9999.99') AS  
"Overtime Rate"  
FROM f_staffs;
```

4. Not all Global Fast Foods staff members have a manager. Create a query that displays the employee last name and 9999 in the manager ID column for these employees.

**Solution:**

```
SELECT last_name, NVL(manager_id, 9999)  
FROM f_staffs;
```

5. Which statement(s) below will return null if the value of v\_sal is 50?
- SELECT nvl(v\_sal, 50) FROM emp;
  - SELECT nvl2(v\_sal, 50) FROM emp;
  - SELECT nullif(v\_sal, 50) FROM emp;
  - SELECT coalesce (v\_sal, Null, 50) FROM emp;

**Solution:**

c

6. What does this query on the Global Fast Foods table return?
- ```
SELECT COALESCE(last_name, to_char(manager_id)) as NAME  
FROM f_staffs;
```

**Solution:**

|           |
|-----------|
| LAST_NAME |
| DOE       |
| MILLER    |
| TUTTLE    |

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- 7.
- Create a report listing the first and last names and month of hire for all employees in the EMPLOYEES table (use TO\_CHAR to convert hire\_date to display the month).

**Solution:**

```
SELECT first_name||' '||last_name "Name", to_char(hire_date,'Month')  
"Anniversary Month"  
FROM employees;
```

- Modify the report to display null if the month of hire is September. Use the NULLIF function.

**Solution:**

```
SELECT first_name||' '||last_name "Name",  
NULLIF(to_char(hire_date,'Month'),'September') "Anniversary Month"  
FROM employees;
```

8. For all null values in the specialty column in the DJs on Demand d\_partners table, substitute “No Specialty.” Show the first name and specialty columns only.

**Solution:**

```
SELECT first_name, NVL(specialty,'No Specialty') AS Specialty  
FROM d_partners;
```

Extension:

Show/discuss Demo: The Basics of Using Functions

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#### SECTION 2 LESSON 3 – Conditional Expressions

##### Vocabulary

Directions: Identify the vocabulary word for each definition below.

|                                      |                                                                                            |
|--------------------------------------|--------------------------------------------------------------------------------------------|
| <u><b>DECODE</b></u>                 | Compares an expression to each of the search values                                        |
| <u><b>Conditional expression</b></u> | An if-then-else expression whose value depends on the truth-value of a Boolean expression. |
| <u><b>CASE</b></u>                   | Implements conditional processing within a SQL statement; it meets the ANSI standard       |

##### Try It / Solve It

1. From the DJ on Demand d\_songs table, create a query that replaces the 2-minute songs with “shortest” and the 10-minute songs with “longest.” Label the output column “Play Times.”

**Solution:**

```
SELECT id, title, duration,  
DECODE(duration, '2 min', 'shortest', '10 min', 'longest')  
AS "Play Times"  
FROM d_songs;
```

2. Use the Oracle database employees table and CASE expression to decode the department id. Display the department id, last name, salary and a column called “New Salary” whose value is based on the following conditions:  
If the department id is 10 then 1.25 \* salary  
If the department id is 90 then 1.5 \* salary  
If the department id is 130 then 1.75 \* salary  
Otherwise, display the old salary.

**Solution:**

```
SELECT last_name, department_id, salary,  
CASE department_id WHEN 10 THEN salary*1.25  
WHEN 90 THEN salary*1.50  
WHEN 130 THEN salary*1.75  
ELSE salary END As "New Salary"  
FROM employees;
```

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3. Display the first name, last name, manager ID, and commission percentage of all employees in departments 80 and 90. Display the manager ID in an additional column called "Review." If they don't have a manager, display the commission percentage. If they don't have a commission, display 99999.

**Solution:**

```
SELECT first_name, last_name, manager_id, commission_pct,  
COALESCE(manager_id, commission_pct, 99999) AS "Review"  
FROM employees  
WHERE department_id IN( 80,90);
```