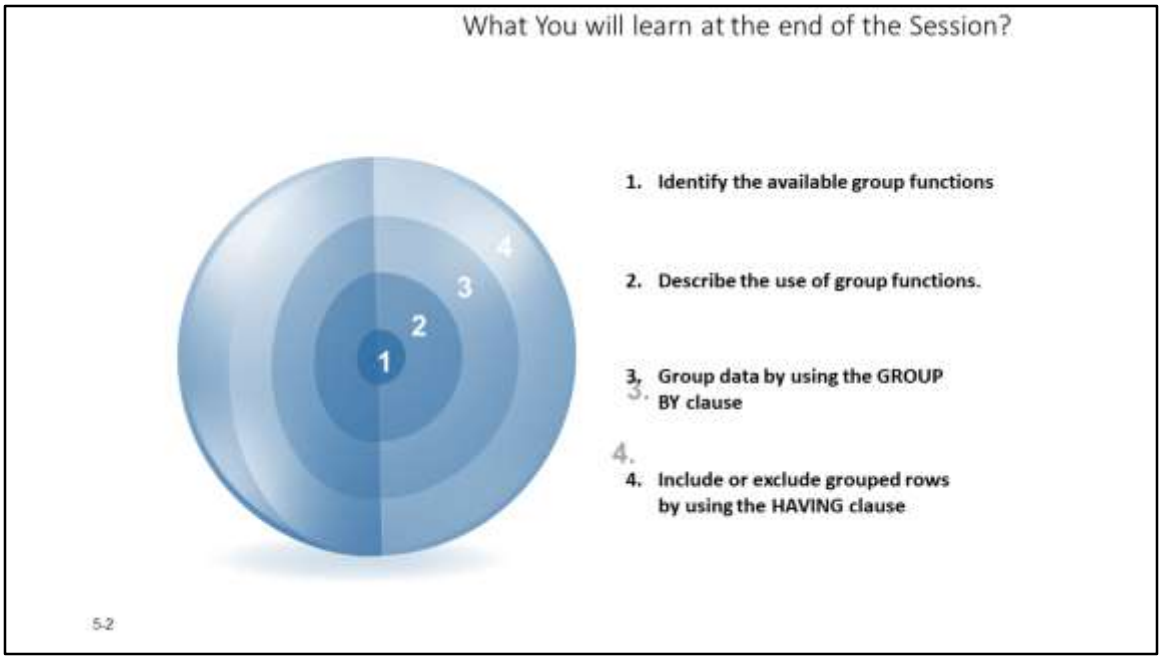
Lesson 5

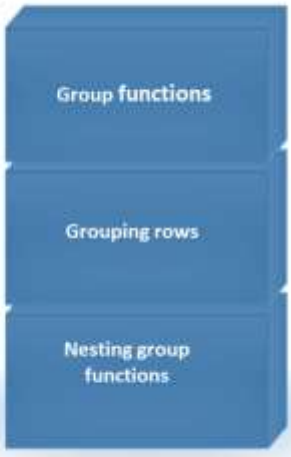
Reporting Aggregated Data Using the Group Functions



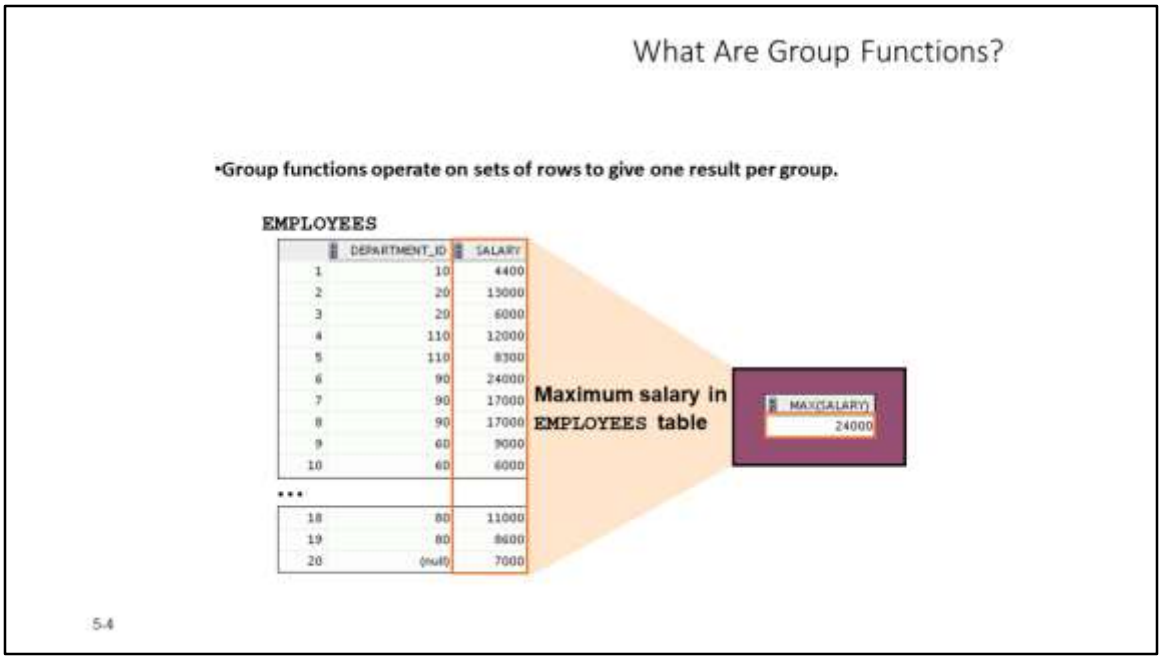
What you will learn at the end of this Session?

This lesson further addresses functions. It focuses on obtaining summary information (such as averages) for groups of rows. It discusses how to group rows in a table into smaller sets and how to specify search criteria for groups of rows.

Session Plan

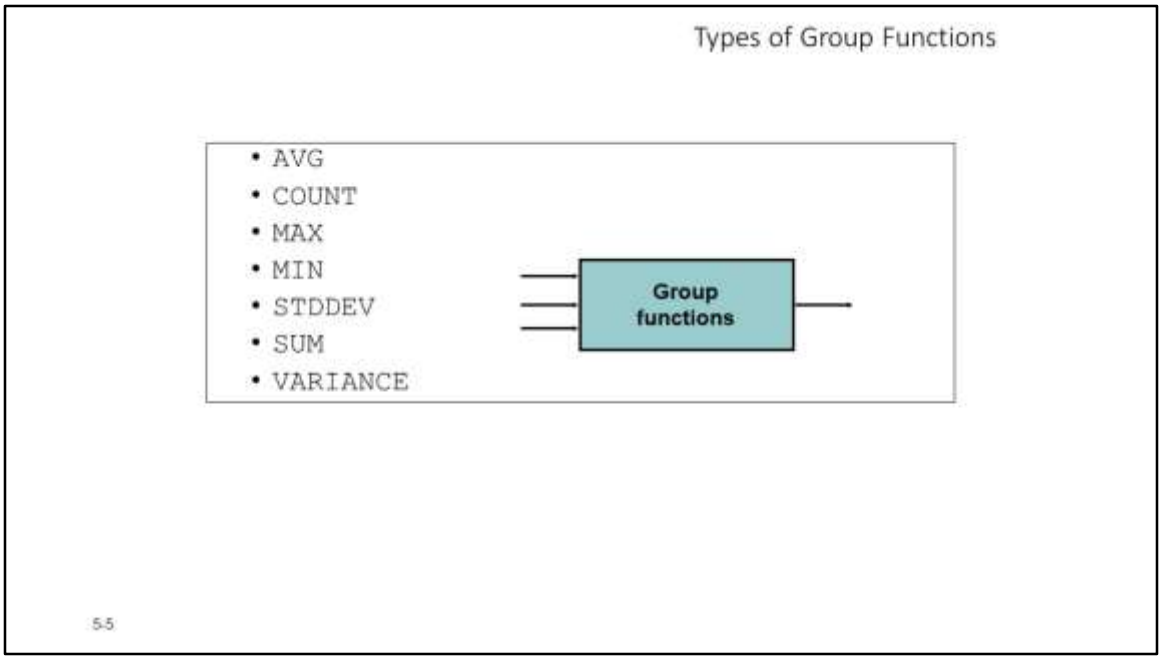


1. Group functions:
   - Types and syntax
   - Use AVG, SUM, MIN, MAX, COUNT
   - Use the DISTINCT keyword within group functions
   - NULL values in a group function
2. Grouping rows:
   GROUP BY clause
   HAVING clause
3. Nesting group functions



What Are Group Functions?

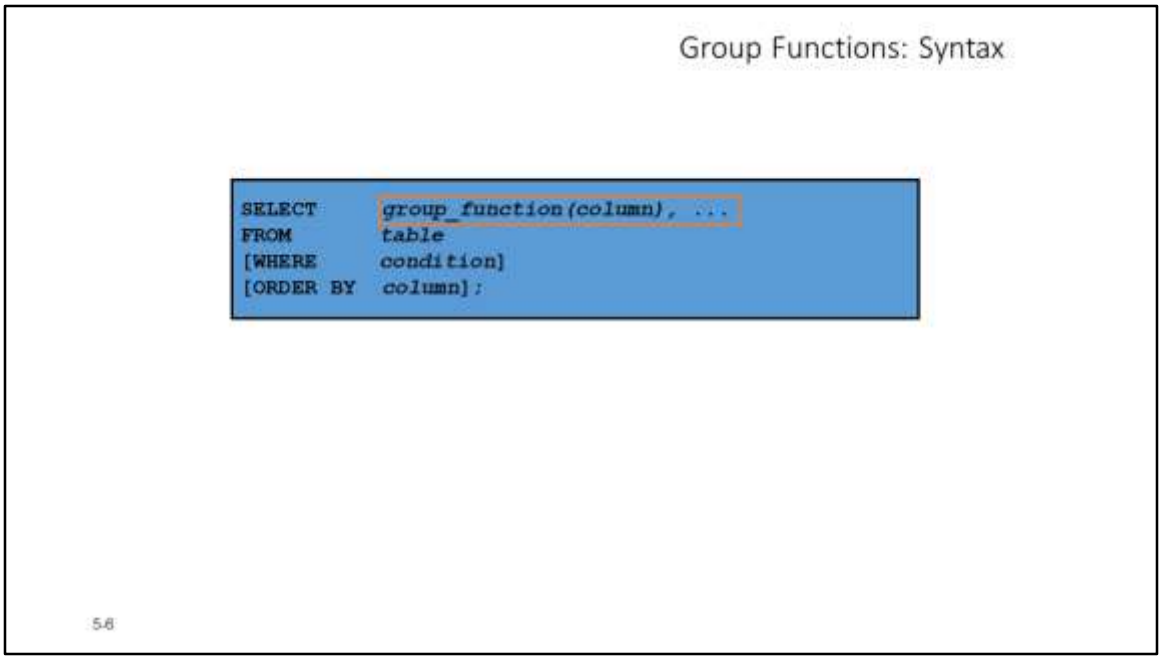
Unlike single-row functions, group functions operate on sets of rows to give one result per group. These sets may comprise the entire table or the table split into groups.



Types of Group Functions

Each of the functions accepts an argument. The following table identifies the options that you can use in the syntax:

Function	Description
AVG([DISTINCT|ALL]*n*)	Average value of *n*, ignoring null values
COUNT({*|[DISTINCT|ALL]*expr*})	Number of rows, where *expr* evaluates to something other than null (count all selected rows using *, including duplicates and rows with nulls)
MAX([DISTINCT|ALL]*expr*)	Maximum value of *expr*, ignoring null values
MIN([DISTINCT|ALL]*expr*)	Minimum value of *expr*, ignoring null values
STDDEV([DISTINCT|ALL]*n*)	Standard deviation of *n*, ignoring null values
SUM([DISTINCT|ALL]*n*)	Sum values of *n*, ignoring null values
VARIANCE([DISTINCT|ALL]*n*)	Variance of *n*, ignoring null values



Group Functions: Syntax

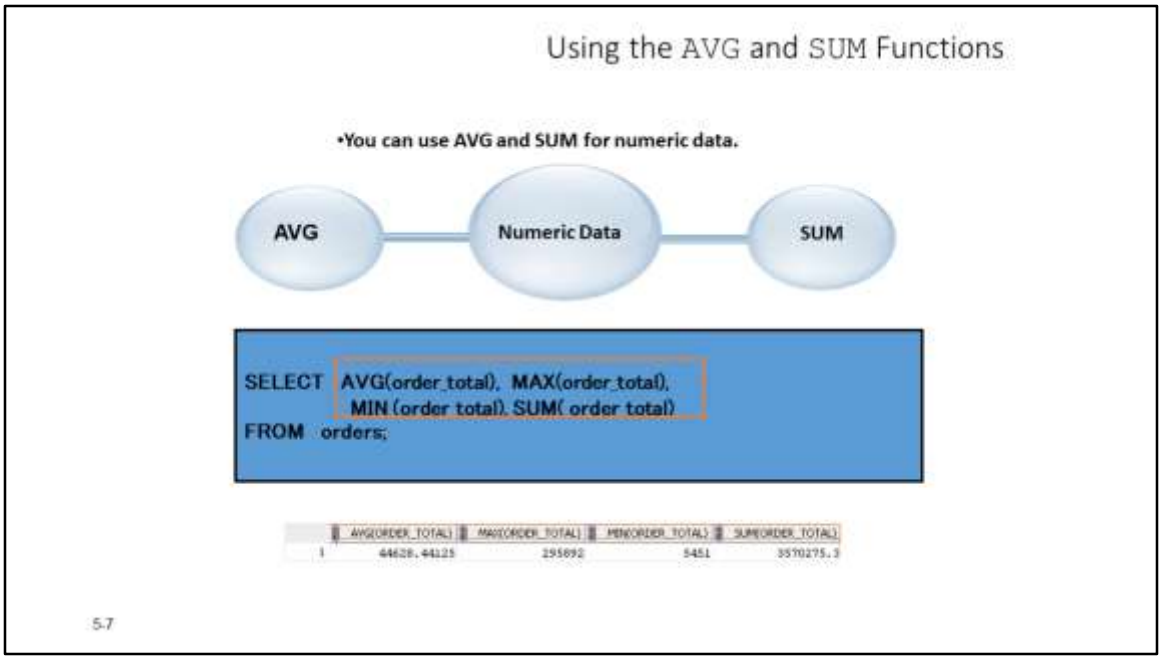
The group function is placed after the `SELECT` keyword. You may have multiple group functions separated by commas.

Guidelines for using the group functions:

- `DISTINCT` makes the function consider only nonduplicate values; `ALL` makes it consider every value, including duplicates. The default is `ALL` and, therefore, does not need to be specified.

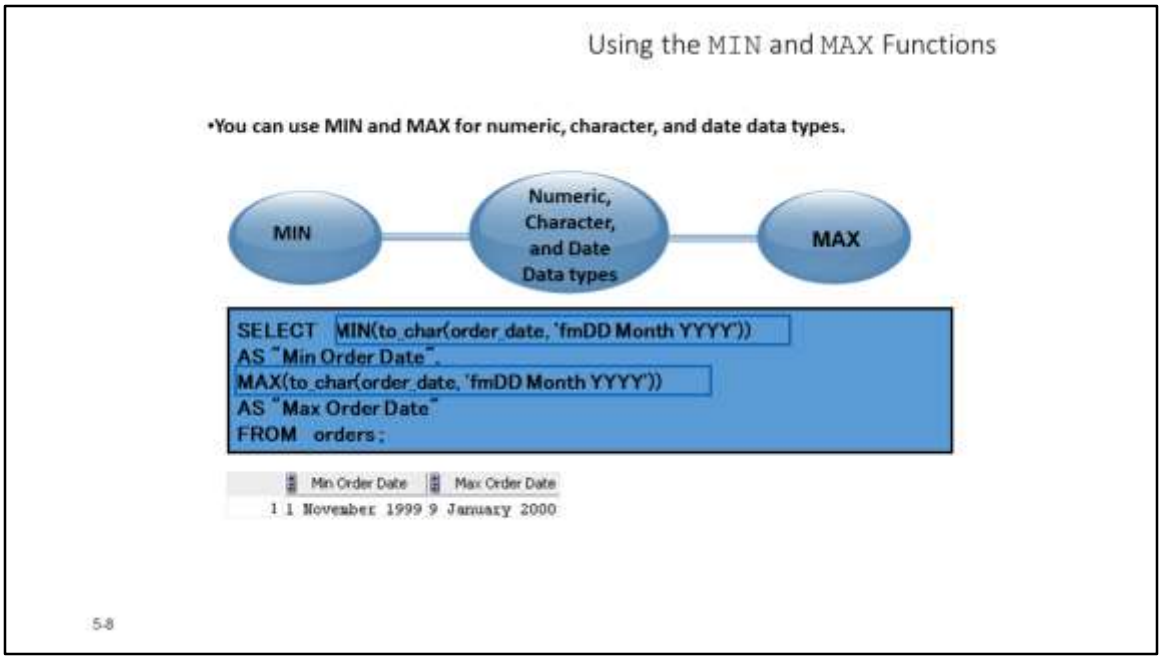
The data types for the functions with an `expr` argument may be `CHAR`, `VARCHAR2`, `NUMBER`, or `DATE`.

All group functions ignore null values. To substitute a value for null values, use the `NVL`, `NVL2`, `COALESCE`, `CASE`, or `DECODE` functions.



Using the AVG and SUM Functions

You can use the AVG, SUM, MIN, and MAX functions against the columns that can store numeric data. The example in the slide displays the average, highest, lowest, and sum of the total value of each order.



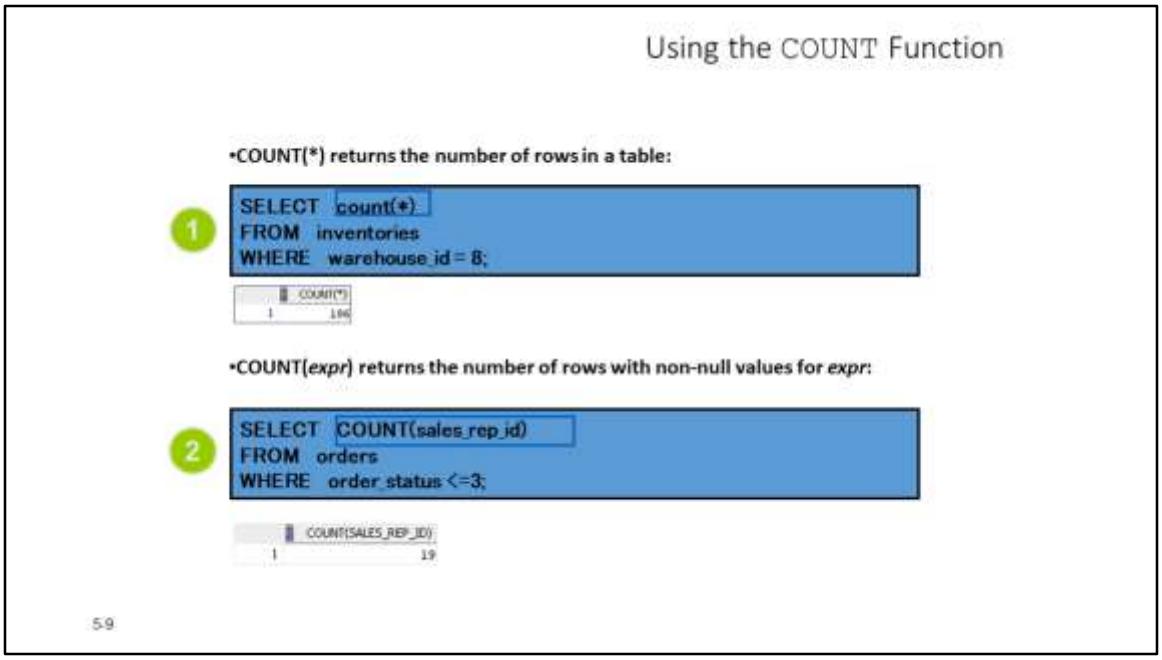
Using the `MIN` and `MAX` Functions

You can use the `MAX` and `MIN` functions for numeric, character, and date data types. The example in the slide displays the oldest and the latest orders.
The following example displays the employee last name that is first and the employee last name that is last in an alphabetic list of all employees:

```
SELECT MIN(last_name), MAX(last_name)
FROM   employees;
```

Note: The `AVG`, `SUM`, `VARIANCE`, and `STDDEV` functions can be used only with numeric data types. `MAX` and `MIN` cannot be used with `LOB` or `LONG` data typ

	MIN(LAST_NAME)	MAX(LAST_NAME)
1	Abel	Zlotkey



Using the COUNT Function

The COUNT function has three formats:

- COUNT(*)
- COUNT(*expr*)
- COUNT(DISTINCT *expr*)

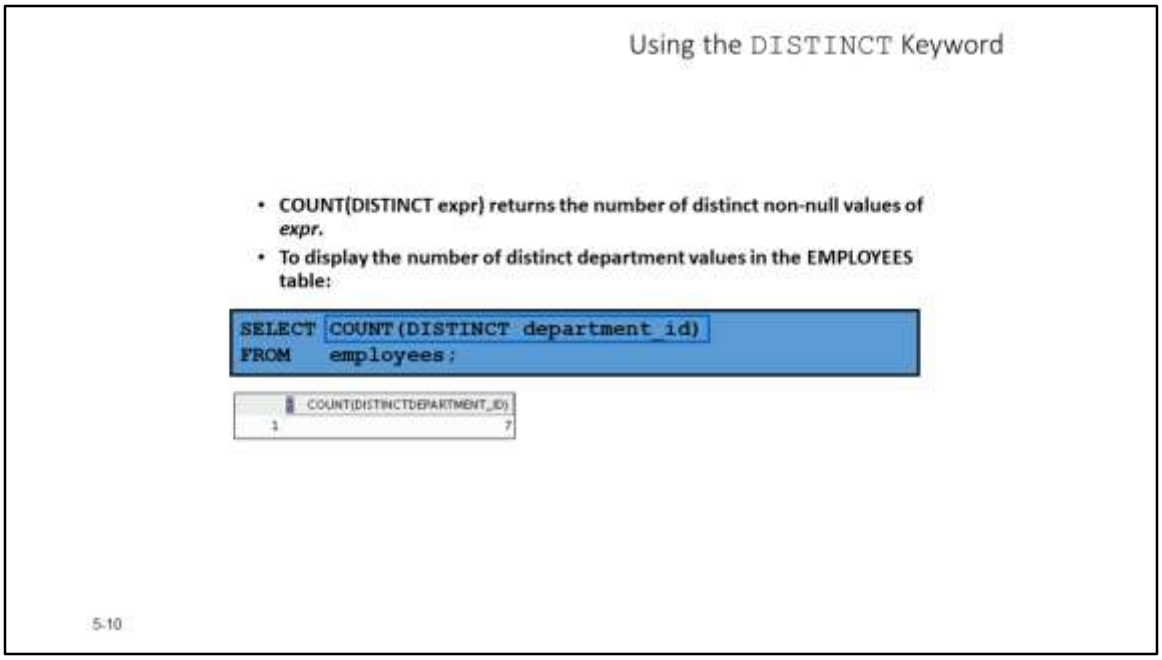
COUNT(*) returns the number of rows in a table that satisfy the criteria of the SELECT statement, including duplicate rows and rows containing null values in any of the columns. If a WHERE clause is included in the SELECT statement, COUNT(*) returns the number of rows that satisfy the condition in the WHERE clause.

In contrast, COUNT(*expr*) returns the number of non-null values that are in the column identified by *expr*.

COUNT(DISTINCT *expr*) returns the number of unique, non-null values that are in the column identified by *expr*.

Examples:

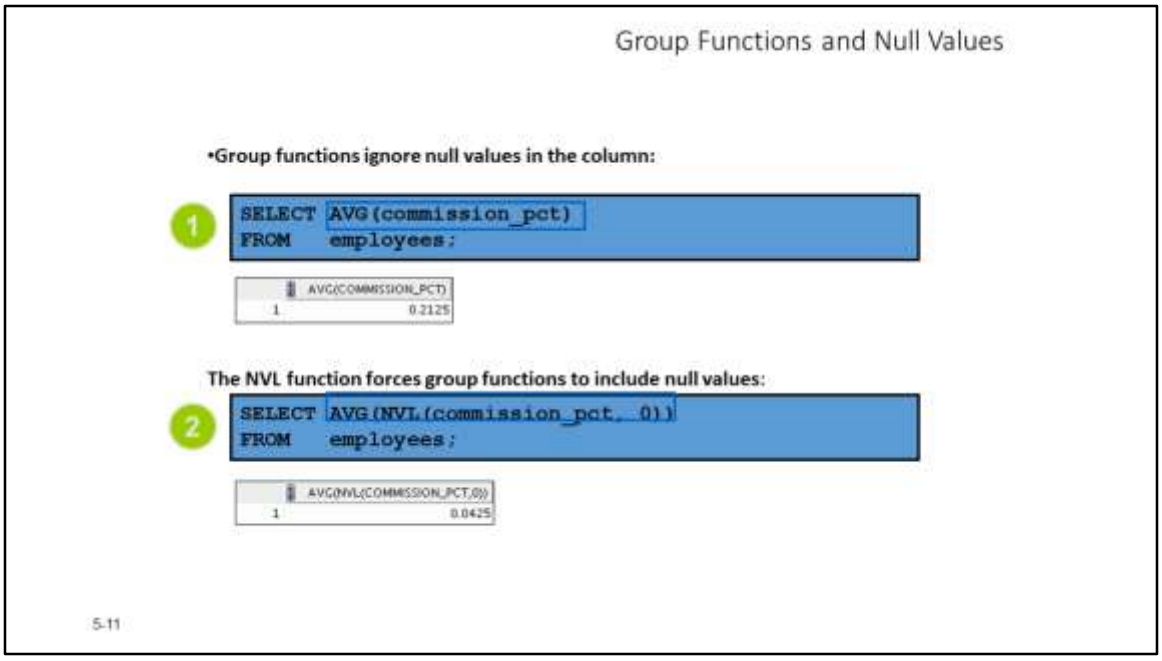
1. The example in the slide displays the number of orders in warehouse 8.
2. The example in the slide displays the number of orders with status <= 3 and whose sales_rep_id is not null.



Using the DISTINCT Keyword

Use the DISTINCT keyword to suppress the counting of any duplicate values in a column.

The example in the slide displays the number of distinct department values that are in the EMPLOYEES table.



Group Functions and Null Values

All group functions ignore null values in the column.

However, the `NVL` function forces group functions to include null values.

Examples:

1. The average is calculated based on *only* those rows in the table in which a valid value is stored in the `COMMISSION_PCT` column. The average is calculated as the total commission that is paid to all employees divided by the number of employees receiving a commission (four).
2. The average is calculated based on *all* rows in the table, regardless of whether null values are stored in the `COMMISSION_PCT` column. The average is calculated as the total commission that is paid to all employees divided by the total number of employees in the company (20).