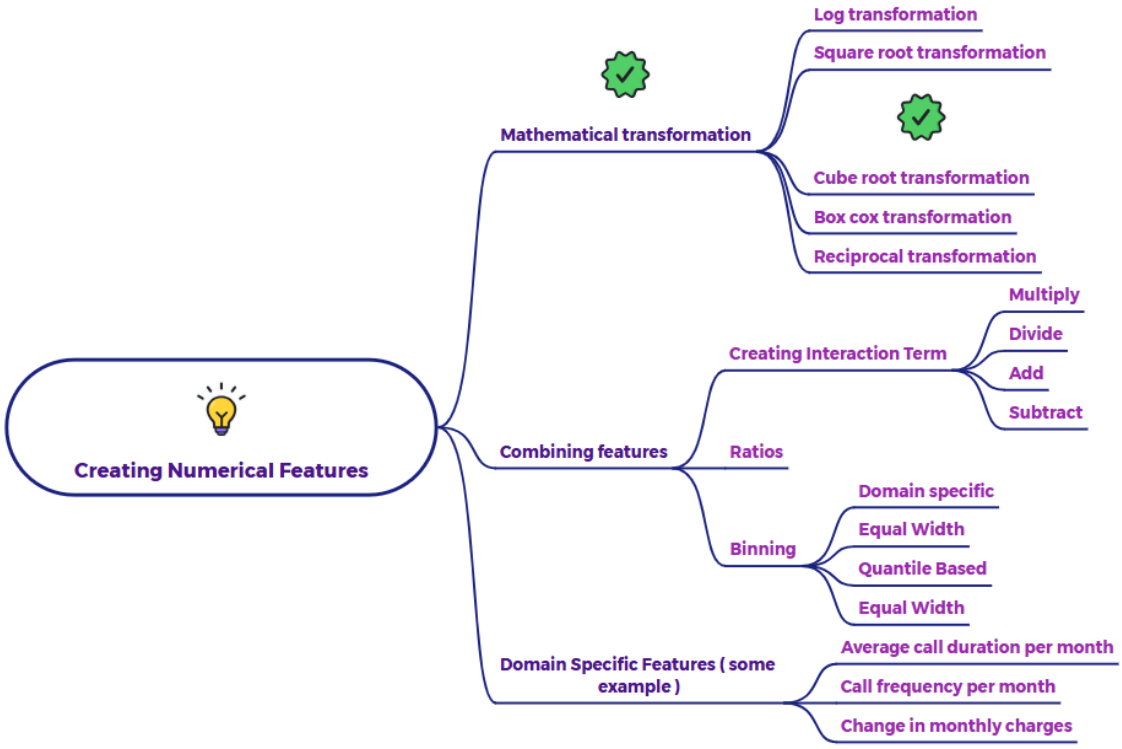
## Explain Cube root transformation with an example




Cube root transformation is a mathematical operation that involves applying the cube root function to a set of values. In simpler terms, it helps to reshape data, particularly when dealing with values that have a skewed distribution. Instead of looking at the raw values, we look at their cube roots.

### Here's a breakdown of why and how it's used, along with an example:

### Why use Cube Root Transformation?

- **Reduces Skewness**: Data can often be skewed, meaning it's not symmetrically distributed around the mean. Cube root transformation is effective in reducing skewness, especially when dealing with moderate skewness. By compressing the larger values and expanding the smaller ones, it can make the distribution more symmetrical, which is often desirable for statistical analysis.
- **Handles Negative Values**: Unlike the square root transformation, cube root transformation can be applied to both positive and negative

values. This makes it a versatile tool for datasets that include a range of values.

- **Stabilizes Variance:** In some cases, it can also help to stabilize variance, though it's generally less effective for this purpose than the square root or log transformations.
- **Linearizes Relationships:** Can help linearize relationships between variables.

**How it Works:**

The cube root of a number x is a value y such that y^3 = x. This transformation can be applied to both positive and negative numbers.

If you have a dataset with values x1, x2, x3,..., xn, the cube root transformed data would be cbrt(x1), cbrt(x2), cbrt(x3),..., cbrt(xn).

**Example:**

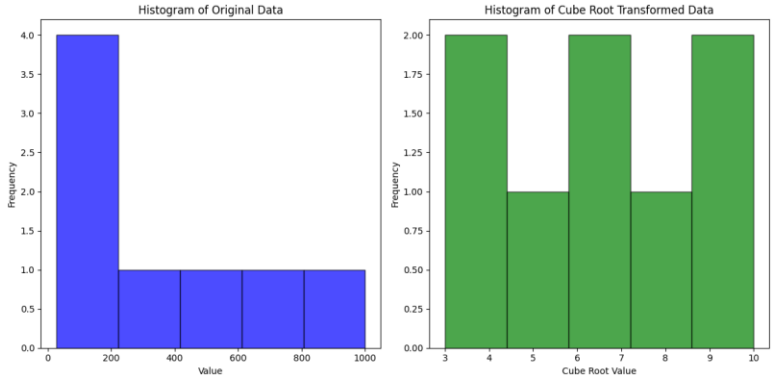
Let's consider a dataset with values representing sales volume of different products: 27, 64, 125, 216, 343, 512, 729, 1000

If we look at the distribution of this data, it is likely to be right-skewed because the values increase rapidly.

Now, let's apply the cube root transformation to these values:

| Cube root Transformation |
|---|
| cbrt(27) = 3 |
| cbrt(64) = 4 |
| cbrt(125) = 5 |
| cbrt(216) = 6 |
| cbrt(343) = 7 |
| cbrt(512) = 8 |
| cbrt(729) = 9 |
| cbrt(1000) = 10 |

If we were to plot the distribution of these cube root-transformed values, we would likely see a distribution that is less skewed and more closely resembles a normal distribution compared to the original data.




In summary, cube root transformation is a useful technique for reshaping data to reduce skewness, handle negative values and make the data more suitable for certain statistical analyses.