Python Code for Insurance Company Model and Premium Chart

Python

import pandas as pd  
import matplotlib.pyplot as plt  
  
class VehicleInsurance:  
 def \_\_init\_\_(self, vehicle\_value, annual\_premium\_rate):  
 self.vehicle\_value = vehicle\_value  
 self.annual\_premium\_rate = annual\_premium\_rate  
  
 def calculate\_premium(self, years\_insured):  
 """Calculates the premium based on years insured and vehicle depreciation."""  
 depreciation\_rate = 0.07 # 7% annual depreciation  
 for year in range(1, years\_insured + 1):  
 self.vehicle\_value \*= (1 - depreciation\_rate)  
 return self.vehicle\_value \* self.annual\_premium\_rate  
  
# Example usage  
vehicle\_value = 20000 # Initial vehicle value  
annual\_premium\_rate = 0.02 # 2% annual premium rate  
  
insurance = VehicleInsurance(vehicle\_value, annual\_premium\_rate)  
  
# Calculate premiums for different durations  
years\_insured = range(1, 11) # Calculate premiums for 1 to 10 years  
monthly\_premiums = [insurance.calculate\_premium(year) / 12 for year in years\_insured]  
quarterly\_premiums = [insurance.calculate\_premium(year) / 4 for year in years\_insured]  
yearly\_premiums = [insurance.calculate\_premium(year) for year in years\_insured]  
  
# Create a DataFrame to visualize the data  
data = {'Years Insured': years\_insured,  
 'Monthly Premium': monthly\_premiums,  
 'Quarterly Premium': quarterly\_premiums,  
 'Yearly Premium': yearly\_premiums}  
df = pd.DataFrame(data)  
  
# Create a line chart to visualize the premiums  
plt.figure(figsize=(12, 6))  
plt.plot(df['Years Insured'], df['Monthly Premium'], label='Monthly Premium')  
plt.plot(df['Years Insured'], df['Quarterly Premium'], label='Quarterly Premium')  
plt.plot(df['Years Insured'], df['Yearly Premium'], label='Yearly Premium')  
plt.xlabel('Years Insured')  
plt.ylabel('Premium')  
plt.title('Premium vs. Years Insured')  
plt.legend()  
plt.grid(True)  
plt.show()

**Explanation:**

1. **Define the VehicleInsurance class:** This class represents an insurance policy for a vehicle. It takes the initial vehicle value and annual premium rate as inputs.
2. **Calculate premium:** The calculate\_premium method calculates the premium based on the number of years insured. It also accounts for vehicle depreciation using a 7% annual rate.
3. **Create an instance:** An instance of the VehicleInsurance class is created with the specified vehicle value and annual premium rate.
4. **Calculate premiums:** Premiums for different durations (monthly, quarterly, and yearly) are calculated for 1 to 10 years.
5. **Create a DataFrame:** A pandas DataFrame is created to store the calculated premiums and the corresponding number of years insured.
6. **Create a chart:** A line chart is plotted using the DataFrame to visualize the premiums over time.

**Output:**

The code will generate a line chart showing the monthly, quarterly, and yearly premiums over the 10-year period. The premiums will decrease over time due to vehicle depreciation.