In [4]:

```
import pandas as pd

bola = {'diameter' : [6,8,10,14,18],
        'harga' : [7,9,13,17.5,20]}

bola_df = pd.DataFrame(bola)
bola_df
```

Out[4]:

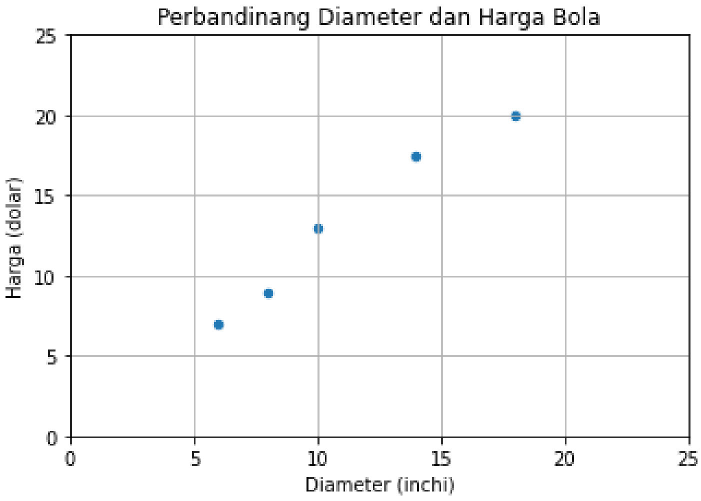
	diameter	harga
0	6	7.0
1	8	9.0
2	10	13.0
3	14	17.5
4	18	20.0

In [5]:

```
import matplotlib.pyplot as plt

bola_df.plot(kind='scatter', x='diameter', y='harga')

plt.title('Perbandinang Diameter dan Harga Bola')
plt.xlabel('Diameter (inchi)')
plt.ylabel('Harga (dolar)')
plt.xlim(0,25)
plt.ylim(0,25)
plt.grid(True)
plt.show()
```



Model Simple Linier Regression

1. **Penyesuaian Dataset**

In [6]:

```
import numpy as np

x = np.array(bola_df['diameter'])
y = np.array(bola_df['harga'])

print(f'x :{x}')
print(f'y :{y}')
```

```
x :[ 6  8 10 14 18]
y :[ 7.   9.  13.  17.5 20. ]
```

In [7]:

```
x = x.reshape(-1,1)
x.shape
```

Out[7]:

```
(5, 1)
```

In [8]:

```
x
```

Out[8]:

```
array([[ 6],
       [ 8],
       [10],
       [14],
       [18]])
```

Training Simple Linier Regression Model

In [9]:

```
from sklearn.linear_model import LinearRegression

model = LinearRegression()
model.fit(x, y)
```

Out[9]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

Visualisasi Simple Linear Regression Model

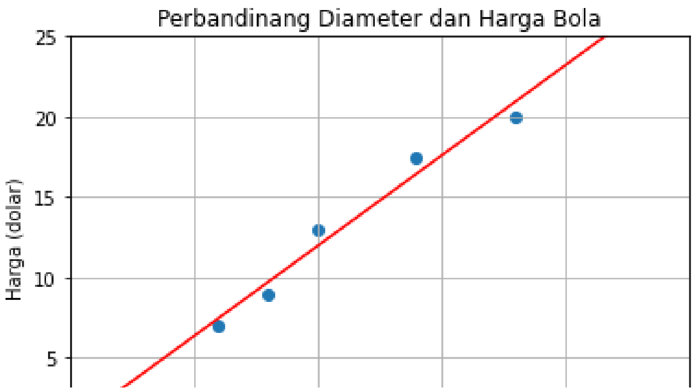
In [10]:

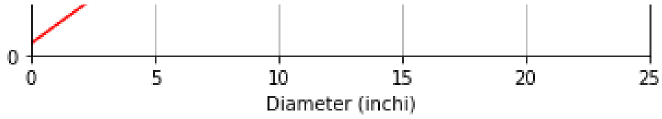
```
x_vls = np.array([0,25]).reshape(-1,1)
y_vls = model.predict(x_vls)
```

In [11]:

```
plt.scatter(x, y)
plt.plot(x_vls, y_vls, '-r')

plt.title('Perbandinang Diameter dan Harga Bola')
plt.xlabel('Diameter (inchi)')
plt.ylabel('Harga (dolar)')
plt.xlim(0,25)
plt.ylim(0,25)
plt.grid(True)
plt.show()
```





In [12]:

```
print(f'intercept: {model.intercept_}')
print(f'slope: {model.coef_}')
```

```
intercept: 0.7241379310344875
slope: [1.12284483]
```

mencari Nilai Slope

In [14]:

```
print(f'x:\n{x}\n')
print(f'x flatten : {x.flatten()}\n')
print(f'y ; {y}')
```

```
x:
[[ 6]
 [ 8]
 [10]
 [14]
 [18]]

x flatten : [ 6  8 10 14 18]

y ; [ 7.   9.  13.  17.5 20. ]
```

Variance

In [15]:

```
variance_x = np.var(x.flatten(), ddof=1)
print(f'variance: {variance_x}')
```

```
variance: 23.2
```

Covariance

In [16]:

```
np.cov(x.flatten(), y)
```

Out[16]:

```
array([[23.2 , 26.05],
       [26.05, 30.2 ]])
```

In [17]:

```
covariance_xy = np.cov(x.flatten(), y)[0][1]
print(f'covariance : {covariance_xy}')
```

```
covariance : 26.049999999999997
```

Nilai Slope

In [18]:

```
slope = covariance_xy / variance_x
print(f'slope : {slope}')
```

```
slope : 1.1228448275862069
```

In [19]:

```
intercept = np.mean(y) - slope * np.mean(x)
print(f'intercept : {intercept}')
```

```
intercept : 0.7241379310344840
```

prediksi harga bola berdasarkan ukuran diameter

In [20]:

```
diameter_bola = np.array([7, 13, 15]).reshape(-1,1)
diameter_bola
```

Out[20]:

```
array([[ 7],
       [13],
       [15]])
```

In [21]:

```
prediksi_harga = model.predict(diameter_bola)
prediksi_harga
```

Out[21]:

```
array([ 8.58405172, 15.32112069, 17.56681034])
```

In [22]:

```
for dmtr, hrg in zip(diameter_bola, prediksi_harga):
  print(f'Diameter : {dmtr} Prediksi Harga : {hrg}')
```

```
Diameter : [7] Prediksi Harga : 8.584051724137934
Diameter : [13] Prediksi Harga : 15.321120689655174
Diameter : [15] Prediksi Harga : 17.566810344827587
```

Evaluasi simple Linear Regression Model Training & Testing Dataset

In [30]:

```
x_train = np.array([6,8,10,14,18]).reshape(-1,1)
y_train = np.array([7,9,13,17.5,20])

x_test = np.array([8,9,11,16,12]).reshape(-1,1)
y_test = np.array([11,8.5,15,18,11])
```

Training Simple Linear Regression Model

In [31]:

```
model = LinearRegression()
model.fit(x_train, y_train)
```

Out[31]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

Evaluasi Linear Regression Model dengan Coefficient of Determination atau R-squared

In [32]:

```
from sklearn.metrics import r2_score

y_pred = model.predict(x_test)

r_squared = r2_score(y_test, y_pred)
print(f'R-squared : {r_squared}')
```

```
R-squared : 0.6213315163349296
```