Mathematics Experiment Report

QUESTION:

Projectile Motion Analysis

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SECTION: B

EXPERIMENT CODE:

```
import numpy as np
import matplotlib.pyplot as plt

def projectile_motion(v0, theta, g=9.81):
    theta_rad = np.radians(theta)
    t_flight = 2 * v0 * np.sin(theta_rad) / g
    t = np.linspace(0, t_flight, 100)
    x = v0 * np.cos(theta_rad) * t
    y = v0 * np.sin(theta_rad) * t - 0.5 * g * t**2
    return x, y, t_flight

v0 = 27  # Initial speed in m/s
angles = [66, 56, 25]  # Launch angles in degrees

fig = plt.figure(figsize=(10, 5))
for theta in angles:
    x, y, t_flight = projectile_motion(v0, theta)
    plt.plot(x, y, label=f"{theta}°")
plt.xlabel("Horizontal Distance (m)")
plt.ylabel("Vertical Distance (m)")
plt.title(f"Projectile Motion (v0 = {v0} m/s)")
plt.legend()
plt.grid()
plt.show()
```

OUTPUT WITH GRAPH:

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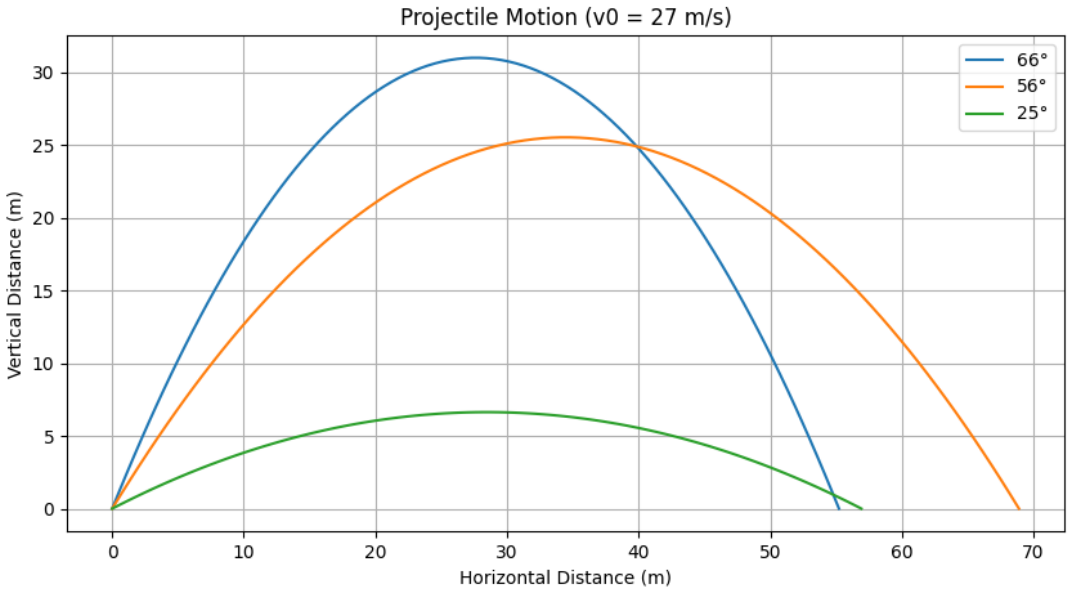

RESULTS:

Initial Speed (v0): 27 m/s

Angle 66°: Time of Flight: 5.03 s | Max Height: 31.01 m | Range: 55.22 m

Angle 56°: Time of Flight: 4.56 s | Max Height: 25.54 m | Range: 68.90 m

Angle 25°: Time of Flight: 2.33 s | Max Height: 6.64 m | Range: 56.93 m