MATHEMATICS INNOVATIVE EXPERIMENT

QUESTION:

Projectile Motion Analysis

NAME: DEMO

USN: DEMO

SECTION: DEMO

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 = 11  # Initial speed in m/s
angles = [58, 52, 63]  # 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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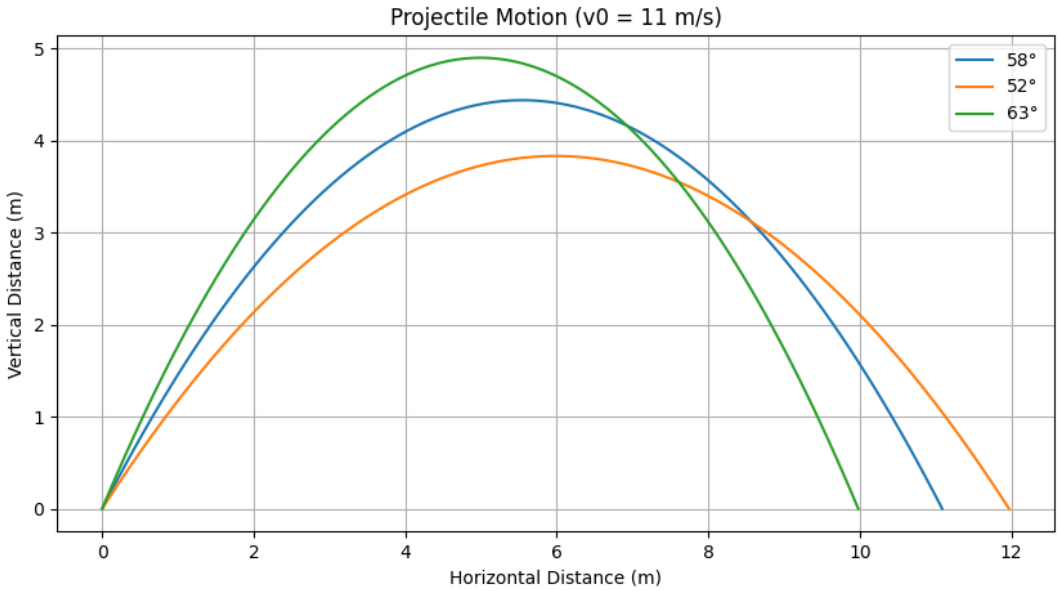

RESULTS:

Initial Speed (v0): 11 m/s

Angle 58°: Time of Flight: 1.90 s | Max Height: 4.44 m | Range: 11.09 m

Angle 52°: Time of Flight: 1.77 s | Max Height: 3.83 m | Range: 11.97 m

Angle 63°: Time of Flight: 2.00 s | Max Height: 4.90 m | Range: 9.98 m