

**Problem 1:** Write a program that determines the range of a projectile using the formula

$$\text{range} = \sin(2 \times \text{angle}) \times \text{velocity}^2 / \text{gravity}$$

where *angle* is the angle of the projectile's path (in radians), *velocity* is the initial velocity of the projectile (in meters per second), and *gravity* is acceleration at 9.8 meters per second squared (a constant).

The takeoff angle must be input in degrees, therefore you must convert this angle to its radian equivalent. This is necessary because the trigonometric function  $\sin(x)$  assumes the argument  $x$  is an angle expressed in radians. An angle in degrees can be converted to radians by multiplying the number of degrees by  $\pi/180$  where  $\pi = 3.14159\dots$  For example,  $45^\circ = 45 \times \pi/180 \approx 0.7853975$  radians. The velocity is presumed to be input in meters per second. Make your interactive dialogue look like this:

```
Takeoff Angle (in degrees): 45.0
Initial Velocity (meters per second): 100.0
Range: 1020.41 meters
```

**Problem 2:** Do project 4B page 140 in Mercer.