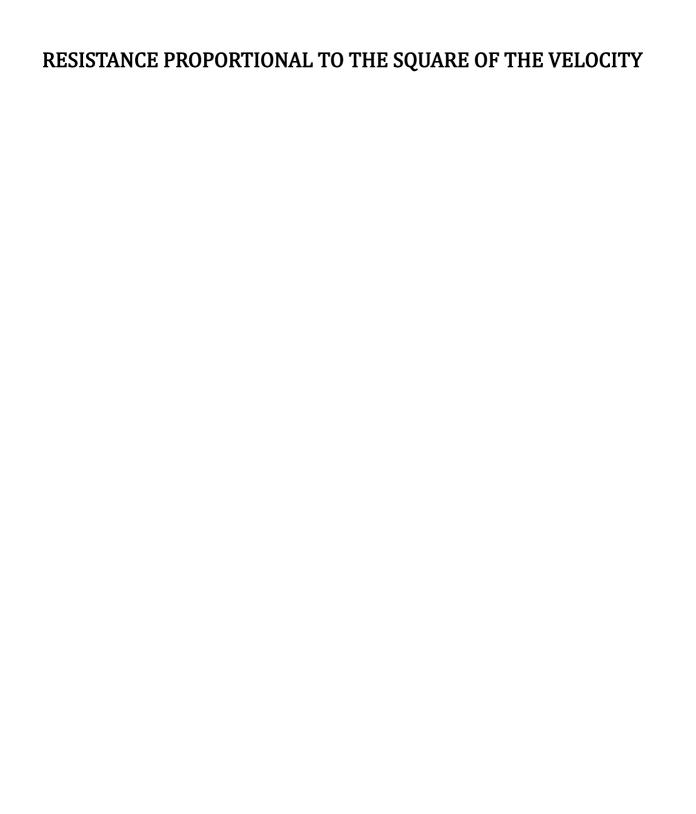
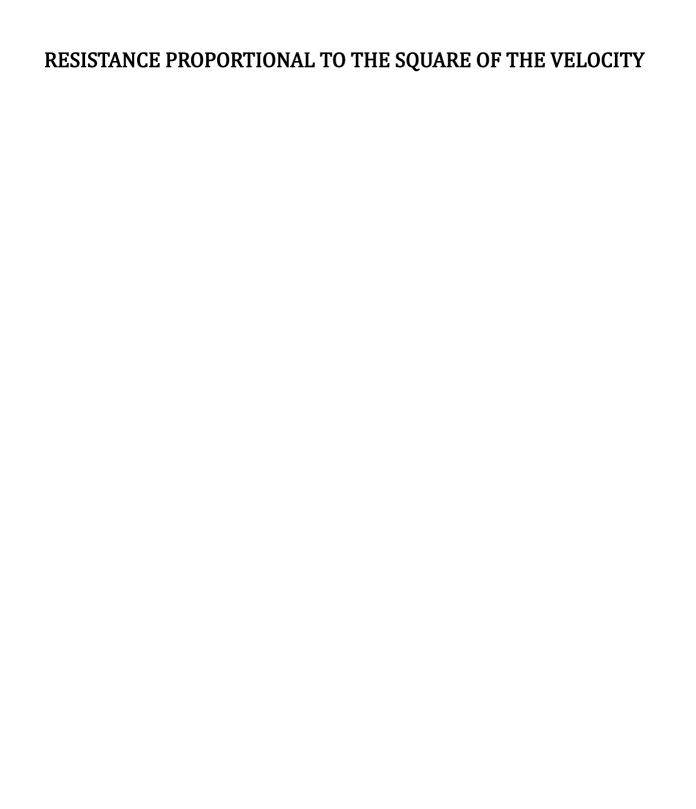
Use the summary of equations given above and appropriate graphing technology, where necessary, to answer the following questions. Use $g = 10 \,\mathrm{m\,s^{-2}}$.

- 1 A projectile is fired at an angle of 45° to the horizontal with an initial velocity of 10√2 m s⁻¹.
 - (a) Write the equation of the trajectory if there is no air resistance.
 - **(b)** If air resistance is proportional to the velocity of the projectile, with *k* = 0.01, write the equation of the trajectory in parametric and Cartesian form.
 - (c) If air resistance is proportional to the square of the velocity of the projectile, with k = 0.01, write the equation of the trajectory in parametric form.
 - (d) Determine, by calculation, the greatest height of attained.
 - (e) Determine, by calculation, the range of the projectile.
 - (f) Graph the path of the projectile in each case.
 - (g) From your graph, determine the greatest height attained in each case.
 - (h) From your graph, determine the range of the projectile in each case.
 - (i) Discuss the significance of your answers.



2 Repeat question 1 with k = 0.05.



3 Repeat question **1** with k = 0.1. Compare your answers to questions **1**, **2** and **3**.



- 4 A projectile is fired at an angle of 30° to the horizontal with an initial velocity of 6 m s⁻¹.
 - (a) Write the equation of the trajectory if there is no air resistance.
 - (b) If air resistance is proportional to the velocity of the projectile, with k = 0.02, write the equation of the trajectory in both parametric form and Cartesian form.
 - (c) If air resistance is proportional to the square of the velocity of the projectile, with k = 0.02, write the equation of the trajectory in parametric form and Cartesian form.
 - (d) Graph the path of the projectile in each case.
 - (e) From your graph, determine the greatest height attained in each case.
 - (f) From your graph, determine the range of the projectile in each case.
 - (g) Discuss the significance of your answers.

