Edexcel A level Maths Projectiles

Section 1: Introduction

Crucial points

1. **Make sure that you are fluent with the constant acceleration equations**
   This must be thoroughly understood before you tackle this section, including working in two dimensions.

2. **Remember that the only force acting on a projectile is gravity**
   It is common for students to believe that there is some kind on force acting on the projectile to make it move. This is incorrect.

   A projectile must have an initial velocity, and a force will have been required to give it this initial velocity – for example, if you throw a ball, a force from your arm accelerates the ball to its initial velocity. However, as soon as the ball has left your hand, i.e. as soon as it becomes a projectile, the force from your arm ceases to act upon it and the only force it is subjected to (ignoring air resistance) is the gravity force, which gives a constant acceleration of g, vertically downwards.

3. **Remember that the horizontal velocity of a projectile does not change**
   This is linked to 3, above. Remember Newton's first law – because there is no horizontal force acting on a projectile, only a vertical force due to gravity, the horizontal velocity of a projectile must remain constant throughout its flight.

4. **Don't assume that a projectile always lands on the same level it started from**
   When finding the position that a projectile lands, or its time of flight, always check to see what the vertical displacement is relative to its starting point.

   A common mistake is to assume that it starts and finishes on the same level, so that its path is symmetrical, meaning its time of flight is twice the time to maximum height and its range is twice the horizontal displacement at maximum height. It saves time to find range and time of flight in this way if the projectile does land at the same level as it starts, but make sure you check it does or you will get the wrong answer!