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Analysis of the problem

3.1.1 – Problem identification

The Problem:

Sixth form students work hard throughout the year in order to achieve good grades in their A levels. When they go home, many like to relax through playing videogames. However, these games are seldom beneficial to their education.

My solution to this is to create a game that requires complex mathematical calculations in order to progress. In this game, users will need to take into account many variables such as air resistance, gravity, speed of release and angle of release to fire a projectile at a target. The game will have many levels and the difficulty of the calculations required will increase as users progress through these levels.

Why the problem is solvable by computational methods:

This problem is solvable by computational methods because the calculation of the projectile path would be done by an algorithm which would take in inputs e.g. gravity, calculate the path and then output this onto the screen via an animation.

Problem recognition:

The overall problem is being able to accurately animate the path that a projectile will take. The underlying problem is calculating the path that the projectile will take by taking into account the variables that may affect its motion. When the underlying problem is overcome, the rest of the solution is simply applying the information relating the motion of the projectile to the animation so that the user can easily see what happens.

Problem decomposition:

This problem can be decomposed into smaller steps.

For each level in the game:

1. Set up projectile and target at certain distances and angles away from each other.
2. Set up the variables such as terrain, air resistance, gravity.
3. Allow the user to input the speed and angle of release of the projectile
4. Use mathematical calculations to work out the motion of the projectile and see if it hits the target.
5. Animate this, making sure to account for the scale of the screen and other potential computer configurations.

Use of divide and conquer

The overall problem can be divided into these smaller steps. Each of these steps can then be conquered individually and combined together to make the final program. Using this method means that the complex overall problem is split into more manageable smaller problems which makes development easier.

3.1.2 – Stakeholders

The users of my software are people that are interested in playing videogames but also want to be intellectually challenged whilst playing the game. Therefore, my game will contain complex mathematical calculations and physics concepts will be incorporated. The stakeholders will range from students who have an interest in physics to perhaps teachers who enjoy solving mathematical problems. Therefore, I will make my game easy to use as their computer ability may vary. I will produce a survey for my stakeholders and users so that I can better understand what they want from my program.