Harder suvat problems

1. A train stops at two stations A and B. It accelerates from rest from station A to a speed of 144 km h^{-1} in 3 minutes and maintains this speed for 10 minutes. It then decelerates for 2 minutes and comes to rest at station B. Find the total distance between A and B.

2. A girl standing on a bridge throws a stone vertically upwards at 6 m s^{-1}. It hits the water below the bridge after 2 seconds. Find the speed at which the stone hits the water and the initial height of the stone.

3. A particle moving in a straight line wth a constant acceleration covers 10 m in the first 2 s and a further 22 m in a further 2 s. How much further does it travel in the next 2 s?

4. A train is brought to rest with uniform deceleration. It travels 30 m in the first 2 s and a further 30 m in the next 4 s. Find:
   (a) the initial velocity
   (b) the deceleration
   (c) the total time to come to rest.

5. A particle accelerates from rest with an acceleration of 3 m s^{-2} to a speed V. It continues at this speed for a time T and then decelerates at 1.5 m s^{-2}. The total time for the motion is 1 minute and the total distance is 1 km. Find a value for V.

6. A ball is thrown vertically upwards at 25 m s^{-1}. Find the length of time for which the ball is above 3 m from the point of projection.

7. A stone is dropped form the top of a cliff and a second later a second stone is thrown vertically downwards at 15 m s^{-1}. Both stones reach the beach at the same time. How high is the cliff?

8. A ball is thrown vertically upwards at 25 m s^{-1} at the same time as another is thrown downwards at 25 m s^{-1}. How far apart are the two balls after 2 seconds?

9. A bus sets off from stop A and accelerates uniformly for t_1 seconds covering 300 m. It then travels at a constant speed v for t_2 seconds covering another 1250 m. It decelerates for t_3 seconds to come to rest at stop B. Given that the total time for the journey is 3 minutes and that $2t_1 = 3t_3$, find t_1, t_2, t_3, v and the distance AB.