

9C First Two SUVAT Equations

1. A cyclist is travelling along a straight road. She accelerates at a constant rate from a speed of 4ms^{-1} to a speed of 7.5ms^{-1} in 40 seconds. Find:

a) The distance travelled over this 40 seconds

b) The acceleration over the 40 seconds

2. A particle moves in a straight line from a point A to B with constant deceleration of 1.5ms^{-2} . The speed of the particle at A is 8ms^{-1} and the speed of the particle at B is 2ms^{-1} . Find:
- a) The time taken for the particle to get from A to B

- b) The distance from A to B

After reaching B the particle continues to move along the straight line with the same deceleration. The particle is at point C, 6 seconds after passing through A. Find:

- c) The velocity of the particle at C

- d) The distance from A to C

9D Final Three SUVAT Equations

1. A particle is moving in a straight line from A to B with constant acceleration 5ms^{-2} . The velocity of the particle at A is 3ms^{-1} in the direction AB. The velocity at B is 18ms^{-1} in the same direction. Find the distance from A to B.

2. A particle is moving in a straight horizontal line with constant deceleration 4ms^{-2} . At time $t = 0$ the particle passes through a point O with speed 13ms^{-1} , travelling to a point A where $OA = 20\text{m}$. Find:

a) The times when the particle passes through A

b) The total time the particle is beyond A

c) The time taken for the particle to return to O

3. A particle is travelling along the x-axis with constant deceleration 2.5ms^{-2} . At time $t = 0$, the particle passes through the origin, moving in the positive direction with speed 15ms^{-1} . Calculate the distance travelled by the particle by the time it returns to the origin.

9E Movement Under Gravity

1. A ball is projected vertically upwards from a point O with a speed of 12ms^{-1} . Find:
 - a) The greatest height reached by the ball

- b) The total time the ball is in the air

2. A book falls off the top shelf of a bookcase. The shelf is 1.4m above the ground. Find:

a) The time it takes the book to reach the floor

b) The speed with which the book strikes the floor

3. A ball is projected upwards from a point X which is 7m above the ground, with initial speed 21ms^{-1} . Find the time of flight of the ball.

4. A particle is projected vertically upwards from a point O with initial speed $u \text{ ms}^{-1}$. The greatest height reached by the particle is 62.5m above the ground. Find:
- a) The speed of projection

- b) The total time for which the ball is 50m or more above the ground

5. A ball, A, falls vertically from rest from the top of a tower 63m high. At the same time as A begins to fall, another ball, B, is projected vertically upwards from the bottom of the tower with velocity 21ms^{-1} . The balls collide. Find the height at which this happens.