

Uniformly Accelerated Motion

Section 1: $v_f = v_i + at$

1. A sprinter starting from rest accelerates at 2.5 m/s^2 for 4.0 s . What is her final velocity?
2. A skateboarder moves at 3.0 m/s and accelerates at 1.2 m/s^2 for 6.0 s . What is his final velocity?
3. A cyclist slows from 10.0 m/s to 6.0 m/s in 2.0 s . What is his acceleration?
4. A train accelerates at 0.80 m/s^2 for 10.0 s . If it reaches $v_f = 15.0 \text{ m/s}$, what was its initial velocity?
5. A soccer ball moving at $v_i = 25.0 \text{ m/s}$ comes to rest in 0.10 s after hitting a goalkeeper's gloves. What is its average acceleration?
6. A car is travelling at $v_i = 20.0 \text{ m/s}$ (about 72 km/h). It brakes with $a = -4.0 \text{ m/s}^2$.
 - (a) How long does it take to stop?
 - (b) What distance does it cover in this time?

Section 2: $d = v_i t + \frac{1}{2} at^2$

1. A ball is dropped from rest. Take $a = -9.8 \text{ m/s}^2$ describing gravity downward. How far does it fall in 1.5 s ?
2. A runner has $v_i = 2.0 \text{ m/s}$ and accelerates at 0.80 m/s^2 for 6.0 s . How far does he travel?
3. An elevator accelerates upward at 1.0 m/s^2 for 3.0 s and covers 12.0 m . What was its initial velocity?
4. A cyclist has $v_i = 5.0 \text{ m/s}$ and covers 60.0 m in 6.0 s . What is her acceleration?
5. A skateboarder starts from rest and accelerates at $a = 2.0 \text{ m/s}^2$. If he travels 36.0 m , how long does it take?
6. A train covers 200 m in 20.0 s while accelerating at $a = 0.50 \text{ m/s}^2$.
 - (a) What was its initial velocity?
 - (b) What was its final velocity?

Section 3: $v_f = v_i + at$ and $d = v_i t + \frac{1}{2}at^2$

1. A cyclist is travelling at 4.0 m/s. She accelerates at 1.5 m/s^2 for 6.0 s. She then immediately begins braking from that final velocity at -2.0 m/s^2 until her velocity becomes 0 m/s.
 - a) What is the cyclist's velocity after accelerating for 6.0 s?
 - b) How far does she travel while accelerating?
 - c) How long does she take to stop once braking begins?
 - d) How far does she travel while braking?
 - e) What is the total time and total distance travelled?

2. A cart enters a test track travelling at 4.0 m/s and leaves travelling at 10.0 m/s. It moves with constant acceleration throughout the track and covers a displacement of 42.0 m.
 - a) Substitute the known values into both equations.
 - b) Graph the two equations using technology, with t on the horizontal x-axis and a on the vertical y-axis.
 - c) Find the point of intersection.
 - d) Interpret the meaning of the coordinates of the intersection in this situation.