**Acceleration**

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| **Term** | **Definition** | **Equation** |
| **Acceleration** | The rate of change of velocity | $$\rightharpoonaccent{a\_{av}}=\frac{\rightharpoonaccent{∆v}}{∆t}$$ |
| **Zero acceleration** |  |  |
| **Negative acceleration** |  |  |
| **Positive acceleration** |  |  |

1. A roller coaster car rapidly picks up velocity as it rolls down a slope. As it starts down the slope, its velocity is 4 m/s. But 3 seconds later, at the bottom of the slope, its velocity is 22 m/s. What is its average acceleration?
2. A cyclist accelerates from 0 m/s to 8 m/s in 3 seconds. What is his acceleration? Is this acceleration higher than that of a car which accelerates from 0 to 30 m/s in 8 seconds?
3. A car advertisement states that a certain car can accelerate from rest to 70 km/h in 7 seconds. Find the car’s average acceleration.
4. A lizard accelerates from 2 m/s to 10 m/s in 4 seconds. What is the lizard’s average acceleration?
5. A runner covers the last straight stretch of a race in 4 s. During that time, he speeds up from 5 m/s to 9 m/s. What is the runner’s acceleration in this part of the race?
6. You are traveling in a car that is moving at a velocity of 20 m/s. Suddenly, a car 10 meters in front of you slams on it’s brakes. At that moment, you also slam on your brakes and slow to 5 m/s. Calculate the acceleration if it took 2 seconds to slow your car down.
7. A ball is dropped from the top of a building. After 2 seconds, it’s velocity is measured to be 19.6 m/s. Calculate the acceleration for the dropped ball.

CHALLENGE QUESTIONS

1. If a Ferrari, with an initial velocity of 10 m/s, accelerates at a rate of 50 m/s2 for 3 s, what will its final velocity be?
2. Falling objects drop with an average acceleration of 9.8 m/s2. If an object falls from a tall building, how long will it take before it reaches a velocity of 49 m/s?
3. Ms. Harrison-Weiss rolled a bowling ball down a lane in 2.5 s. The ball traveled at a constant acceleration of 1.8 m/s2 down the lane and was traveling at a velocity of 7.6 m/s by the time it reached the pins at the end of the lane. How fast was the ball going when it left Ms. Harrison-Weiss’ hand?