**Acceleration Questions**

1. A car changes velocity from 58.0 km h-1 to 20.0 km h-1 to avoid hitting a dog. The change in velocity took 4.50 s.
   1. Find the car’s acceleration.
   2. Explain why the value is negative.
   3. How much longer will it take the car to stop if it continues to brake at the same rate?
2. Dill, Tommy’s little brother, is following Tommy around the back yard. For one part of the journey, Dill crawls 3.60 m south then 4.10 m east. If this took 9.80 s,
   1. what was Dill’s speed?
   2. what was Dill’s velocity?
3. Leela is walking along at 1.90 m s-1 when she sees the neighbour’s sheep wandering into her yard. She immediately takes off at a run (obviously to herd them back home) at 6.30 m s-1 in the same direction. If the change in velocity took place in 0.900 s, what was Leela’s acceleration?
4. Freddy Frog hops along at 0.6 m s-1. He accelerates at 1.7 m s-2 to reach a final velocity of 1.4 m s-1. How long did he take to reach his final velocity?
5. Tom walks into the house with a mouse in his mouth. Tom is then frightened by Spike, so he drops the mouse, which immediately takes off with an acceleration of 0.8 m s-2 to reach a velocity of 1.6 m s-1 in 0.34 s. Assuming that the mouse had an initial velocity equal to that of Tom (it was in his mouth, after all!) and that the whole journey was in a straight line, what was the initial velocity of the mouse?
6. When Robyn dropped a rock off a cliff, it struck the water below after 5.00 s with a speed of 40.0 m s-1.
   1. What is the acceleration of the rock?
   2. Calculate the rock’s average velocity.
7. What change in velocity do astronauts experience in a rocket that accelerates upwards at 21.5 m s-2 over a period of 5.50 s?

1. Terry threw a baseball high above his head and then caught it again before it hit the ground. Its total flight time was 5.00 s. Given that the acceleration due to gravity is 9.8 m s-1,
   1. Calculate the speed at which Terry flung the ball into the air
   2. Calculate the ball’s speed just before it strikes Terry’s hands.
2. David pedals his bike for 10 s at a constant speed of 5 m s-1 when he decides to increase the speed. By pushing firmly on the pedals, he accelerates his bike at a constant rate of 2.50 m s-2 for 4.0 s. David then applies the brakes that decelerates his bike at the rate of 6.0 m s-2 until it comes to rest. What will his speed be after 14.0 s?
3. A student on a scooter is nearly involved in an accident. After travelling downhill, he has a speed of 12 m s-1 when he sees a pedestrian 30 m ahead of him. He immediately puts on the rear brakes, which provide a deceleration of 2.5 m s-2
   1. With what speed does the student hit the pedestrian?
   2. How would the calculations change if he had been listening to music and had a reaction time of 0.5 s? Find the new impact speed.
   3. If in scenario b) the pedestrian was able to avoid the reckless scooter rider, how far would the scooter rider travel after seeing the pedestrian before coming to a complete halt?