$$a = \frac{v_f - v_i}{t} \qquad t = \frac{v_f - v_i}{a} \qquad \begin{aligned} v_f &= v_i + at \\ v_i &= v_f - at \end{aligned}$$

Must be answered on a separate sheet of loose-leaf and all your work must be shown including a sentence!!

1. A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its average acceleration?

2. A car accelerates at a rate of 3.0 m/s². If its initial speed is 8.0 m/s, how many seconds will it take the car to reach a final speed of 25.0 m/s?

3. 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 100km/h in 10 seconds?

4. The final speed of a car is 108km/h. The car is accelerating at a rate of 2.5km/h/s over an 8 second period of time. What is the initial speed of the car?

5. If a Ferrari, with an initial speed of 10 m/s, accelerates at a rate of 50 m/s² for 3 seconds, what will its final velocity be?

6. A car traveling at a speed of 30.0 m/s encounters an emergency and comes to a complete stop**.** How much time will it take for the car to stop if its rate of deceleration is -4.0 m/s²?

7. A cart rolling down an incline for 5.0 seconds has an acceleration of 4.0 m/s². If the cart has an initial speed of 2.0 m/s, what is its final speed?

8. A parachute on a racing dragster opens and changes the speed of the car from 190 km/h to 20km/h in a period of 4.5 seconds. What is the acceleration of the dragster?

9. A motorcycle traveling at 25 m/s accelerates at a rate of 7.0 m/s² for 6.0 seconds. What is the final speed of the motorcycle?

10. A skier accelerates at a rate of 4.6m/s² for 4.5s. What is his initial speed if his final speed is 21m/s?

11. A hockey puck sliding on a frozen lake comes to rest after traveling 175s. If its initial velocity is 1.0m/s, what is its acceleration?

12. Batman's bat mobile is travelling at a speed of 80m/s and is decelerating at a rate of -11m/s² when it comes to a screeching halt because of a moose crossing the road. How long does it take the bat mobile to stop?

13. At the end of Bill's run he is travelling a speed of 18.5km/h. What is his initial speed if his acceleration is 0.25km/h² and he accelerates for 2hours?

14. A snowmobile reaches a final speed of 22.5m/s after accelerating at 1.2m/s² for 17s. What was the initial speed of the snowmobile?

15. A cyclist accelerates at a rate of 5.5 m/s². How long will it take the cyclist to reach a speed of 18.3 m/s if he is starting from rest?