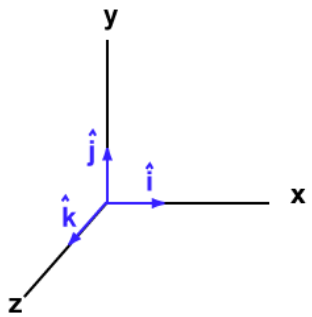
Practice Problems

$\Delta x = v_{avg} t \Rightarrow \Delta x = v_i t + \frac{1}{2} a t^2$

$v_f = at + v_i \Rightarrow v_f^2 = v_i^2 + 2a\Delta x$

The standard 4 kinematic equations.



Use the 4 equations (models) above to answer the following questions. (Note: Remember to use negative signs, where appropriate.)

1. A bicyclist is going 6.2 m/s eastward. He accelerates eastward at a constant 0.8 m/s/s for 5.0 seconds. Find the cyclist's (a) final velocity and (b) the displacement.
2. A car is driving northward at 14.1 m/s and accelerates (at a constant rate) to 25.0 m/s northward. If the car's displacement during this acceleration is 70.4 meters northward, (a) how long was the car accelerating and (b) what was its rate of acceleration?
3. A car, starting from rest, accelerates westward at 1.35 m/s/s for 3.0 seconds. What is its displacement during this time?
4. An airplane is heading northward at 260 m/s. To slow down, it accelerates southward at 40.0 m/s/s. (a) How much is its velocity reduced over a displacement of 200 meters northward? (b) How long does it take to slow to 180 m/s northward?
5. A car begins from rest and accelerates southward at a constant rate for 4.8 seconds. Over this period of time, its average velocity is 12 m/s southward. What is the car's rate of acceleration?
6. A snowmobile is heading toward a tree at some particular speed. The operator releases the throttle and the machine begins to slow at the rate of 4.0 m/s/s. If the snowmobile comes to rest in 35 m, several meters in front of the tree, what was its initial speed?
7. Two cars are 400.0 meters apart and are facing one another. Imagine they're on a single-lane road. Beginning simultaneously, the red one travels forward at a constant speed of 18 m/s, and the blue one travels forward at a constant speed of 26 m/s. After 3.5 seconds, what is the distance between the cars?
8. An airplane increases its velocity from 20 m/s to 35 m/s westward while undergoing a displacement of 515 meters westward. What is the airplane's acceleration during this period?
9. A bus is traveling eastward at 8.20 m/s when it begins to accelerate at 0.55 m/s/s eastward. How long does it take for the bus to travel 61.4 meters eastward?
10. A bus is traveling eastward at 8.20 m/s when it begins to accelerate at 0.55 m/s/s westward. What is its velocity upon covering an additional 30 m eastward?