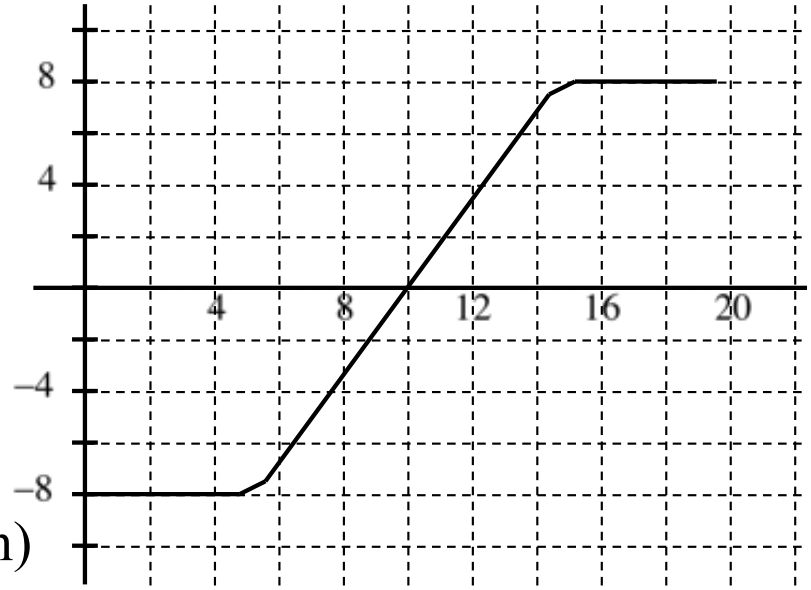
Problem 2.24:



a.) What can you say about the motion of the body whose *Position versus Time* graph is shown to the right.

--The body starts out at x = -8 m in the negative region (to the left of the origin).

--It starts out at rest (it's position stays at -8 m) and keeps v = 0 until around t = 5 seconds.

--It then accelerates briefly in the positive direction (the velocity was zero, then not—whenever there is a *change of velocity*, there must be an acceleration).

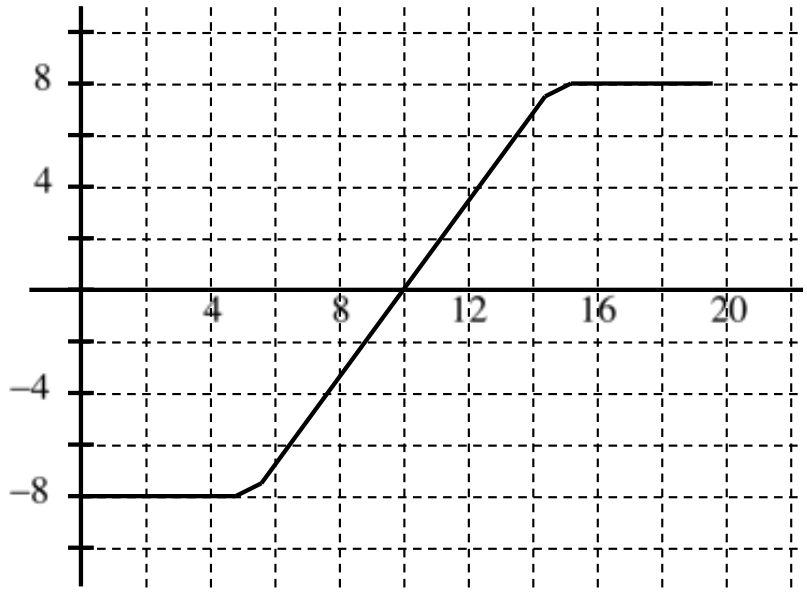
--The body moves with constant, positive velocity (slope of graph constant, +).

--The body passes through the origin at t = 10 sec and continues on with same velocity until around t = 14 seconds whereupon it accelerates briefly to stop.

--From there on, it stays stationary (v = 0) at x = 8 m.

--Notice that at no point did the body turn around in its motion. A peak or trough would have had to be present if a turn-around had been present.

b.) What can you say about the motion of the body whose *Velocity versus Time* graph is shown to the right.



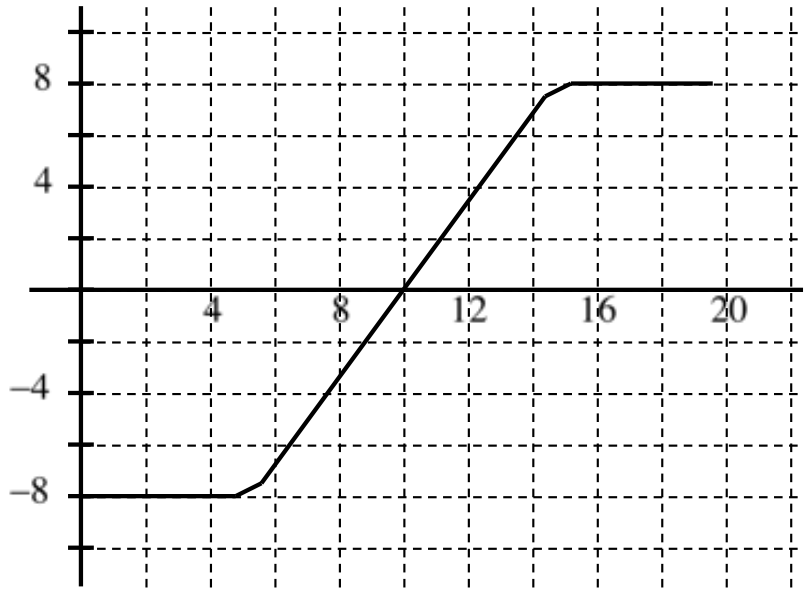
--The body starts out at an *unknown position* with a constant, negative velocity v = -8 m/s (note that this means the body is moving toward the left).

--At t = 5 seconds, an acceleration motivates the body's velocity to begin to migrate toward zero (i.e., the body is slowing). For an object to slow, the acceleration must be opposite the direction of the velocity. As our velocity is negative, that means that the body's acceleration must be positive.

--The body continues to slow until t = 10 seconds whereupon the its velocity is zero (it has stopped). The acceleration continues (the slope hasn't changed) motivating the body into the positive velocity region. This means the body is now moving in the opposite direction, which means it has executed a *turn-around*.

--At around t = 14 seconds, the acceleration changes motivating the body to a constant velocity at v = 8 m/s, which it continues to follow from then on.

b.) What can you say about the motion of the body whose *Acceleration versus Time* graph is shown to the right.



--The body starts out at an unknown position with an unknown velocity and experiences a constant acceleration of -8 m/s/s. We can't tell if this is speed the body up or slowing the body down because we don't know the direction of the body's velocity during this period of time.

--At t = 5 seconds, the acceleration begins to migrate toward zero (the body's velocity-change is slowing).

--At t = 10 seconds, the acceleration is zero—no velocity-change at all.

--After t = 10 seconds, the acceleration changes direction, becomes positive and begins to increase. We still don't know in what direction the body is traveling, so we still don't know if this sign change is speeding the body up or down (and just because the acc is flip-flopping doesn't mean the velocity is flip-flopping).

--At around t = 14 seconds, the increase levels off to a constant acceleration which means the body continuously changes its velocity thereafter at +8 m/s/s.