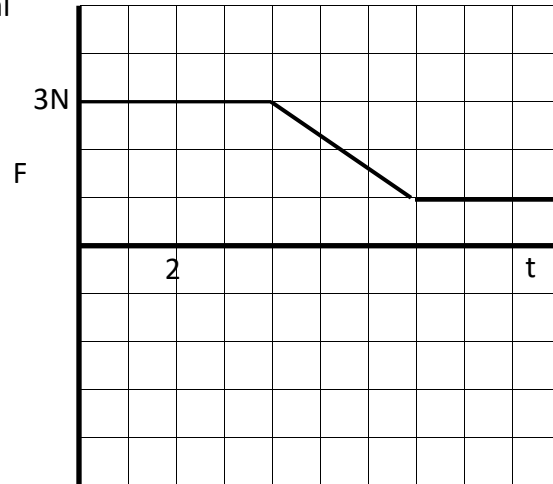
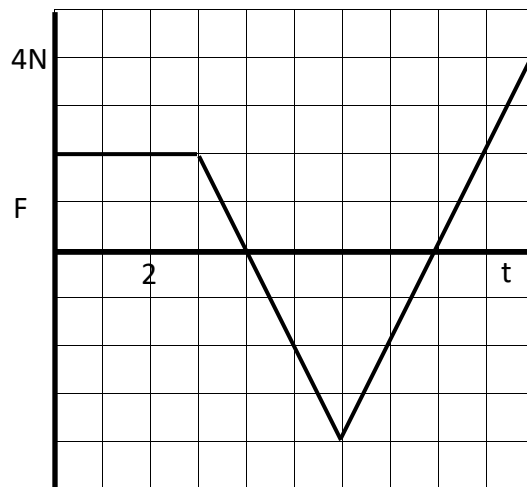




3. An object of mass, 5.0 kg, and an initial velocity of 4.0 m/s, is acted upon by a force shown in the graph.
- Determine the final velocity.
  - Determine the average force.



4. An object of mass, 4.0 kg, and initial velocity, 10 m/s, is acted upon by a force as shown in the graph
- Determine the final velocity.
  - Determine the average force.



5. The average accelerating force exerted on a 5.0 kg shell in a gun barrel is  $5.0 \times 10^4$  N, and the muzzle velocity is 200 m/s. Calculate (a) the impulse on the shell, and (b) the length of time it takes to move up the heavy gun barrel.  
[ Ans:  $1.0 \times 10^3$  Ns;  $2.0 \times 10^{-2}$  s ]

6. A hockey puck of mass 0.20 kg is sliding along a smooth, flat section of ice at 18 m/s when it encounters some snow. After 2.5 s of sliding through the snow, it returns to smooth ice, continuing to slide at a speed of 10 m/s.
- What is the change in momentum of the puck?
  - What impulse does the snow exert on the puck?
  - What average frictional force does the snow exert on the puck?
- [ Ans: -1.6 kg m/s (forward), 1.6 kg m/s (backward), 0.64 N (backward) ]

7. A 2.0 kg skateboard is rolling across a smooth, flat floor when a small girl kicks it, causing it to speed up to 4.5 m/s in 0.50 s without changing direction. If the average force exerted by the girl on the skateboard in its direction of motion was 6.0 N, with what initial velocity was it moving?

[ Ans: 3.0 m/s (forward) ]

8. A 200 kg shot is discharged horizontally from a cannon, of mass  $2.0 \times 10^4$  kg, with a speed of 250 m/s relative to the ground.

a) Find the steady force which, acting on the cannon, will stop its recoil in 2.0 s.

b) How far will the cannon recoil?

[ Ans:  $2.5 \times 10^4$  N; 2.5 m ]