13. $PE_0 + KE_0 = PE + KE$

$mgh + 0 = 0 + \frac{1}{2}mv^2$

$mgh = \frac{1}{2}mv^2$

$v = \sqrt{2gh} = \Delta v$

14. $PE_0 + KE_0 = PE + KE$

$0 + \frac{1}{2}mv_0^2 = mgh + 0$

$v_0 = \sqrt{2gh}$

$v = 0$

$\Delta v = -\sqrt{2gh}$

15. $PE_0 + KE_0 + W_{nc} = PE + KE$

$0 + \frac{1}{2}mv^2 - F_{Fr}d = 0 + 0$

$\frac{1}{2}mv^2 = F_{Fr}d$

$d = \frac{mv^2}{2F_{Fr}}$

16. $PE_{s0} + PE_{g0} + KE_0 = PE_s + PE_g + KE$

$0 + 0 + \frac{1}{2}mv^2 = \frac{1}{2}kx^2 + 0 + 0$

$\frac{1}{2}mv^2 = \frac{1}{2}kx^2$

$\sqrt{\frac{mv^2}{k}} = x$

17. $PE_0 + KE_0 + W_{NC} = PE + KE$

$mgh + \frac{1}{2}mv^2 - W_{Fr} = 0 + \frac{1}{2}mv^2$

$mgh = W_{Fr}$

18. $PE_{g0} + PE_{s0} + KE_0 = PE_g + PE_s + KE$

$0 + \frac{1}{2}kx^2 + 0 = 0 + 0 + \frac{1}{2}mv^2$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$

$\sqrt{\frac{kx^2}{m}} = v$

19. $PE_0 + KE_0 = PE + KE$

$0 + \frac{1}{2}m\left(\sqrt{\frac{kx^2}{m}}\right)^2 = mgh + 0$

$\frac{1}{2}\frac{m\,kx^2}{m} = mgh$

$\frac{kx^2}{2mg} = h$

20. $PE_0 + KE_0 + W_{NC} = PE + KE$

$0 + 0 + W_{NC} = mgh + 0$

$W_{NC} = mgh$

21. $W_{By\,car} = -mgh$

Car pushes road backward with same force.

$-F(d) = -W$