19. $V_o = 0 m/s$

$V_s = 35.5 m/s$

$V = 344 m/s$

$f = 670 Hz$

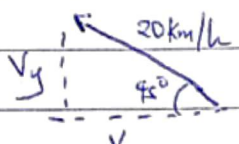
By the dreppler effect formula:

$$f_1 = f\left(\frac{V - V_o}{V - V_s}\right)$$

$$= 670\left(\frac{344 - 0}{344 - 35.5}\right)$$

$$= 747.10 Hz$$

20. a)



~~$V_x = V \cos 45°$~~

~~$= 5.556 \cos 45$~~

~~$=$~~

~~$20 km/h = 5.556 m/s$~~

$V_x = V \cos 45°$

$= 20 \cos 45°$

$= 14.142 km/h$

$V_x = 14.142 km/h$

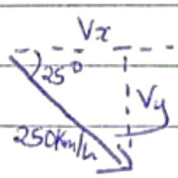
$V_y = 14.142 km/h$

$V_y = V \sin 45°$

$= 20 \sin 45°$

$= 14.142 km/h$

b)



$V_x = V \cos 25°$

$= 250 \cos 25°$

$= 226.58 km/h$

$V_x = 226.58 km/h$

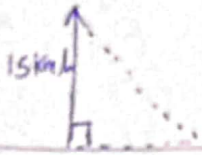
$V_y = 105.65 km/h$

$V_y = V \sin 25°$

$= 250 \sin 25°$

$= 105.65 km/h$

c)



$V_x = 15 \cos 90°$

$= 0 \text{ km/h}$

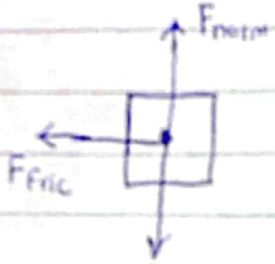
$V_y = 15 \sin 90°$

$= 15 \text{ km/h}$

$V_x = 0 \text{ Km/h}$

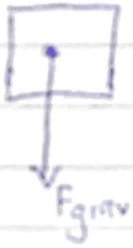
$V_y = 15 \text{ Km/h}$

Q1. a) Truck =>

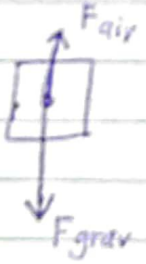


(15092N)

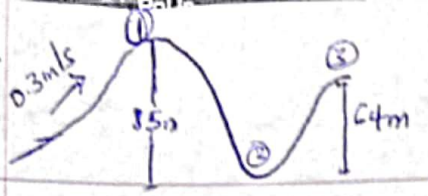
b) Apple =>



c) Skydiver =>



22.



$KE = \frac{1}{2}mv^2$ $\quad PE = mgh$

① $= \frac{1}{2} \times 856 \times 0.3^2$ $\quad = 856 \times 9.8 \times 85$

$= 38.52\,J$ $\quad = 713,048\,J$

② $PE = mgh$

$h = 0$

$PE = 0\,J$

③ $PE_1 + KE_1 = PE_3 + KE_3$

$38.52 + 713,048 = (856 \times 9.8 \times 64) + KE_3$

$KE = 713,086.52 - 536,883.2$

$= 176,203.32\,J$

23. $\lambda = 4L$

$v = f\lambda$

$\lambda = \frac{v}{f}$ $\quad \lambda = \frac{344}{256}$

$\lambda = 1.34375$

$\lambda = 4L$

$L = \frac{\lambda}{4}$

$L = \frac{1.34375}{4} = 0.3359\,m$

24. $Q = mc\Delta T$

$Q_{mix} = Q_1 + Q_2$

5. $F = mg + ma$

a) $F = m(g + a)$

$= 70(9.8 + 0)$

$= 686\,N$

b) $F = m(g + a)$

$= 70(9.8 + 4.9)$

$= 1029\,N$

c) $F = m(g - a)$

$= 70(9.8 - 3.4)$

$= 448\,N$

d) $F = m(g - a)$

$= 70(9.8 + 0)$

$= 686\,N$