Task 2: A speedboat is travelling 1h at 15m/s then it accelerates at $6m/s^2$ for 6s, turns around and continues to travel in the opposite direction for 10 min.
What is the displacement of the speedboat? What is the overall average speed?

$$v = a \cdot t + v_0$$

$$v = v_0 + a \cdot t$$

$$v(6s) = 15\frac{m}{s} + \frac{6m}{s^2} \cdot 6s$$

$$= 51\frac{m}{s} \approx 183{,}6\ \frac{km}{h}$$

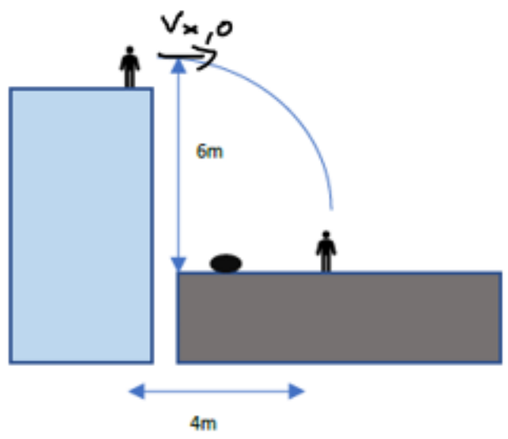
Task 4: Show that each part of this equation can be written as a Distance (use the units).

$$x = x_0 + v_0 t + \frac{1}{2}at^2$$

$$[v_0 \cdot t] = [v_0] \cdot [t] = \frac{m}{s} \cdot s = m = [x]$$

$$[a t^2] = [a] \cdot [t]^2 = \frac{m}{s^2} \cdot s^2 = m = [x]$$

Task 5: Line handling at the pier. Horizontal throw.



You have to hand over the lines.
How fast do you have to throw the lines?
How long will they be in the air?

ges.: $v_{x,0} = ?$

$v_{y,0} = 0$

$$v = a \cdot t + v_0$$

$$v_y(t) = -g \cdot t + v_{y,0}$$

$$s = s_0 + v_0 t + \frac{at^2}{2}$$

I) $x(t) = v_{x,0} \cdot t = 4m$

II) $y(t) = 6m - \frac{1}{2}g \cdot t^2 = 0$

($y_0 = 6m$, $a = -g$, $v_{y,0} = 0$)

aus I) $t = \frac{4m}{v_{x,0}}$

in II): $0 = 6m - \frac{1}{2}g\left(\frac{4m}{v_{x,0}}\right)^2$

$\sqrt{a-b} \neq \sqrt{a} - \sqrt{b}$

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

$0 = 6m - \frac{1}{2}g\frac{16\,m^2}{v_{x,0}^2} \quad | \cdot v_{x,0}^2$

$0 = 6m\,v_{x,0}^2 - \frac{1}{2}g\,16m^2$

$6m\,v_{x,0}^2 = \frac{1}{2}g\,16m^2 \quad | : 6m$

$v_{x,0}^2 = g\frac{4}{3}m \quad | \sqrt{\ }$

$v_{x,0} = \sqrt{\frac{4}{3}g \cdot m} = \sqrt{\frac{4}{3} \cdot 9{,}81\frac{m}{s^2} \cdot m} =$

$= \sqrt{\frac{4}{3} \cdot 9{,}81} \cdot \sqrt{\frac{m^2}{s^2}}$

$\approx 1{,}9\ \frac{m}{s}$

$= 6{,}84\ \frac{km}{h}$

$t = \frac{4m}{v_{0,x}} = \frac{4m}{\sqrt{\frac{4}{3} \cdot 9{,}81}\ \frac{m}{s}} \approx 1{,}1\,s$