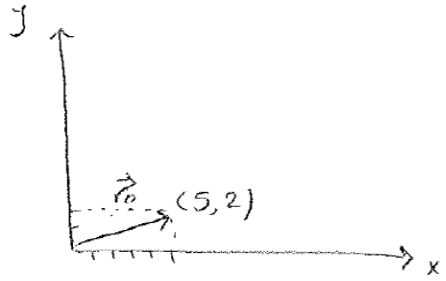
First name and Last name printed correctly as seen on ROSI (1 mark)
Legibility and neatness (1 mark)



a) $\vec{r}_0 = (x_0, y_0) = (5, 2)$

$\vec{r}_{t=2} = ?$

$\vec{r}_{t=2} = (x_{t=2}, y_{t=2})$

$v_x = \frac{dx}{dt} = 3t - 12 \Rightarrow dx = (3t-12)dt \Rightarrow x(t) = \int (3t-12)dt = \frac{3t^2}{2} - 12t + x_0$

$\Rightarrow x(t) = 1.5t^2 - 12t + x_0$ $\Rightarrow$ $\boxed{x(t) = 1.5t^2 - 12t + 5}$

$x_0 = 5$

$v_y = \frac{dy}{dt} = 7t \Rightarrow dy = 7t\,dt \Rightarrow y(t) = \int 7t\,dt = 3.5t^2 + y_0$

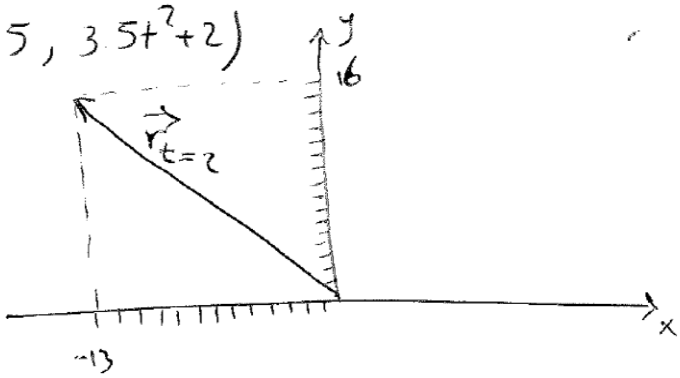
$\Rightarrow y(t) = 3.5t^2 + y_0$ $\Rightarrow$ $\boxed{y(t) = 3.5t^2 + 2}$

$y_0 = 2$

$\Rightarrow \vec{r}(t) = (x(t), y(t)) = (1.5t^2 - 12t + 5,\ 3.5t^2 + 2)$

b) $t = 2 \Rightarrow \vec{r}(2) = (-13, 16)$ m

3 marks



b) $|a|$ @ $t=2$ sec

$a_x = \frac{dv_x}{dt} = \frac{d}{dt}(3t-12) = 3 \ m/s^2$

$a_y = \frac{dv_y}{dt} = \frac{d}{dt}(7t) = 7 \ m/s^2$

$\Rightarrow a(t) = (3, 7)$ = constant at all times

$|a| = \sqrt{3^2+7^2} = \sqrt{9+49} = 7.616 \ m/s^2$

$\Rightarrow \boxed{|a(1)| = 7.616 \ m/s^2}$

3 marks

C)

At time $t = 0s$,

$$v_x = 3(0) - 12 = -12i \left[\frac{m}{s}\right]$$

$$v_y = 7(0) = 0j \left[\frac{m}{s}\right]$$

Therefore, the total velocity when $t = 0s$ is exactly aligned with the negative x-axis. Measuring the angular position of velocity from the positive x-axis gives,

$$\boldsymbol{\theta = -\pi \, rad}$$

2 marks