

- 3 (a) Define *angular velocity*.

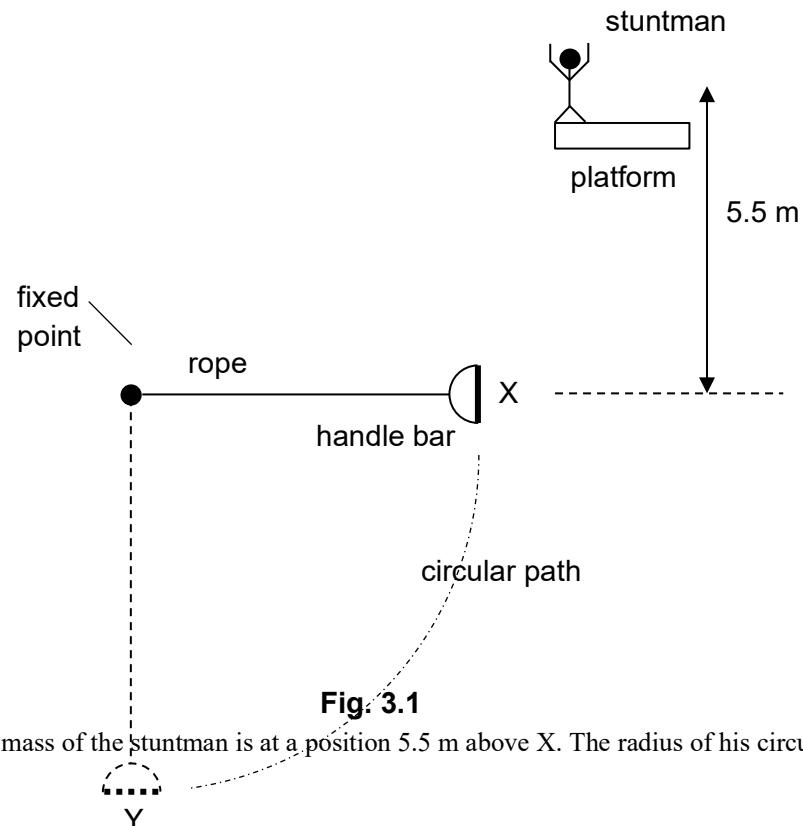
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[1]

- (b) Fig. 3.1 shows the setup for a stunt performance.

The stuntman, of mass 65 kg, steps off the platform from rest. He falls freely and catches a handle bar at position X, where the rope is horizontal. He then moves in a circular path until position Y at the bottom of the circle.

The rope attached to the handle bar is light and inextensible.



The centre of mass of the stuntman is at a position 5.5 m above X. The radius of his circular path is 4.5 m.

- (i) Show that the speed of the stuntman is  $14 \text{ m s}^{-1}$  when he reaches position Y.

[2]

- (ii) Calculate the angular velocity of the stuntman at Y.

$$\text{angular velocity} = \dots \text{rad s}^{-1} \quad [1]$$

- (iii) Calculate the tension in the rope at position Y. Explain your answer.

$$\text{tension} = \dots \text{N} \quad [3]$$

- (iv) The stuntman releases himself from the handle bar just after passing Y.  
Describe his subsequent path after the release.

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..... [1]

