Answer **all** the questions in the spaces provided.

1 A cliff train cabin is used to carry passengers up a slope as shown in Fig.1.1.

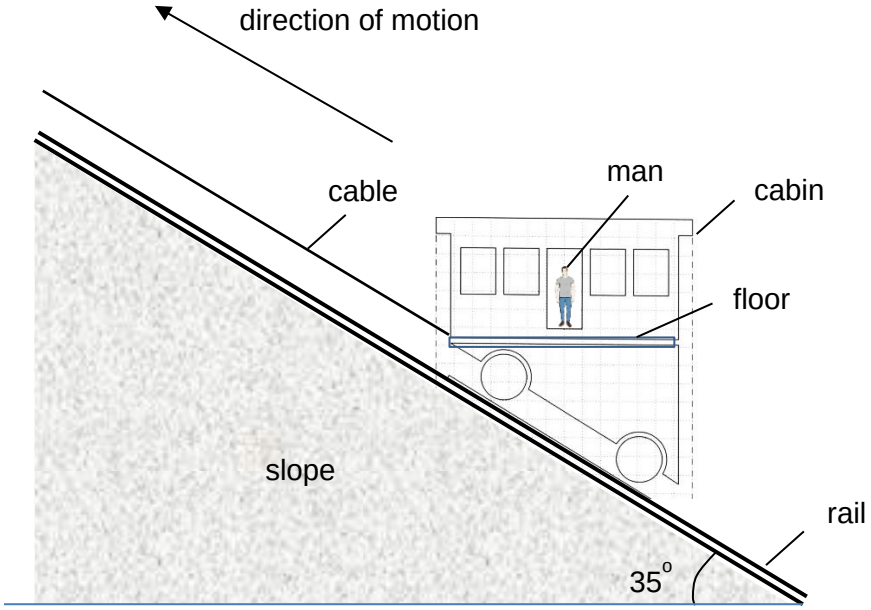

Fig. 1.1

The cable attached to the cabin pulls the cabin up the slope along the rail line which is inclined at 35° to the horizontal.

Initially, the cabin starts from rest and accelerates at 1.0 m s^{-2} for a time of 3.0 s. The cabin then moves at constant speed of 3.0 m s^{-1} for 100 s. Finally, the cabin decelerates to rest in 3.0 s.

The floor of the cabin is horizontal all the times. A man of mass 95 kg is standing upright on the floor of the cabin.

(a) Calculate the vertical height moved by the man during the initial acceleration of the cabin.

height = _____ m [3]

(b) **(i)** Calculate the normal reaction force acting on the man from the floor of the cabin when the cabin is moving at constant speed.

normal reaction = _____ N [1]

(ii) Explain your working in **(b)(i)**.

_____

_____ [1]

(c) Forces act on the man by the floor of the cabin.

(i) State the forces for the man as the cabin accelerates.

_____ [1]

(ii) Explain how these forces produce the acceleration of the man.

_____

_____ [2]

(d) The vertical height *h* of the man varies with time *t*. On the axes below, show qualitatively the variation with time *t* of height *h* for the motion of the man during

(i) the acceleration,

[1]

(ii) the constant speed,

[1]

(iii) the deceleration.

[1]

[Total: 11]