1 A cable car is used to carry a man of mass 95 kg through a vertical height, as illustrated in Fig. 1.1.

For Examiner's Use

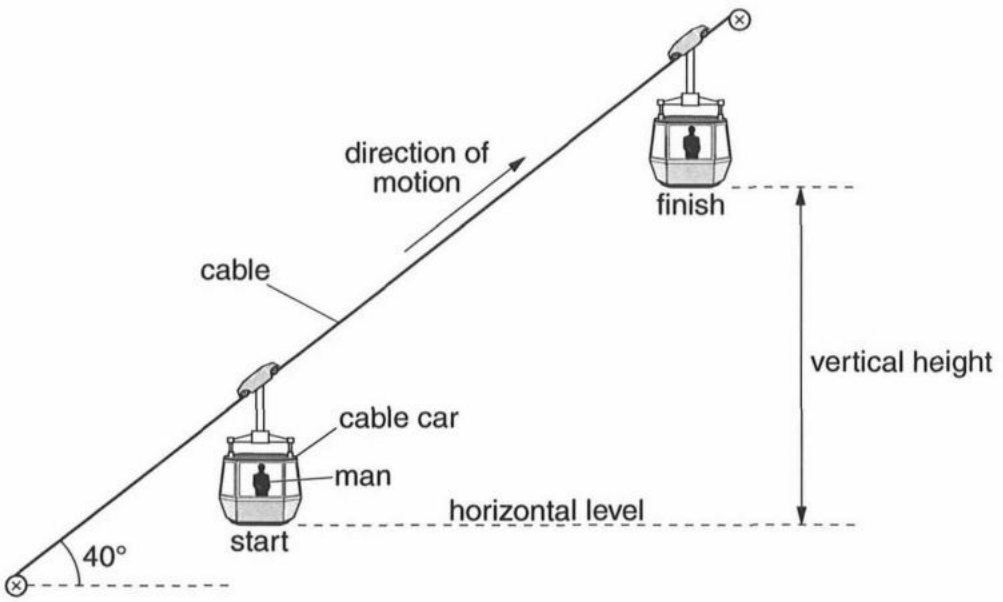

Fig. 1.1 (not to scale)

The cable car is attached to a cable and moves at an angle of 40° to the horizontal. Initially, the cable car starts from rest and accelerates at $1.5\,m\,s^{-2}$ for a time of 2.0 s. The cable car then moves at constant speed of $3.0\,m\,s^{-1}$ for 120 s. Finally, the cable car decelerates to rest in 3.0 s.

The floor of the cable car is horizontal at all times.

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

height = ... m [3]

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

normal reaction = ... N [1]

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

.....

..... [1]

(c) Forces act on the man through the floor of the cable car.

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(i) State the forces for the man as the cable car accelerates.

.....

..... [1]

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

.....

..... [2]

(d) Calculate the gain in potential energy of the man for the complete journey from start to finish.

potential energy = ... J [3]

(e) 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

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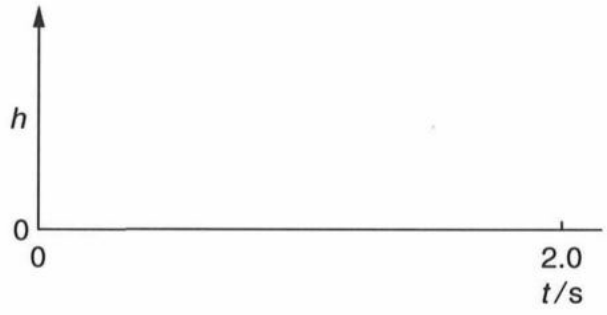
(i) the acceleration,



[1]

(ii) the constant speed,

[1]

(iii) the deceleration.

[1]