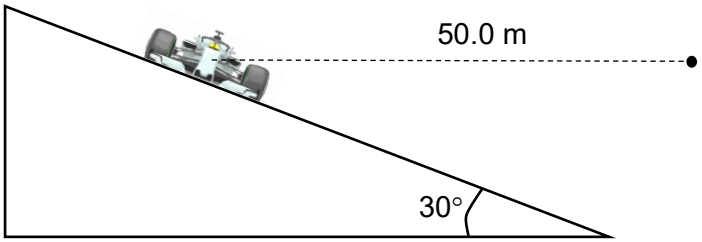
2 Fig. 2.1 shows a cross-sectional view of a Formula 1 racing car travelling on a rough track that is banked such that it makes an angle of 30° with the horizontal. At a certain bend along the track, the radius of curvature is 50.0 m. The mass of the car is 1000 kg.



centre of circle

Fig. 2.1

(a)

Explain briefly how the banked track assists the car in travelling round the bend.

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……………………………………………………………………………………………………….

……………………………………………………………………………………………….

[2]

(b)

The driver tries to negotiate the bend **at its maximum speed** without slipping.

(i)

In Fig. 2.1, draw a free-body diagram of the forces acting on the car.

[3]

(ii)

Given that the maximum frictional force between the wheels of the car and the track is 6000 N, calculate this maximum speed.

maximum speed = …….. m s^{-1}

[3]

[Total: 8]