1 **(a)** Use Newton's laws of motion to explain why a body moving with uniform speed in a circle must experience a force towards the centre of the circle.

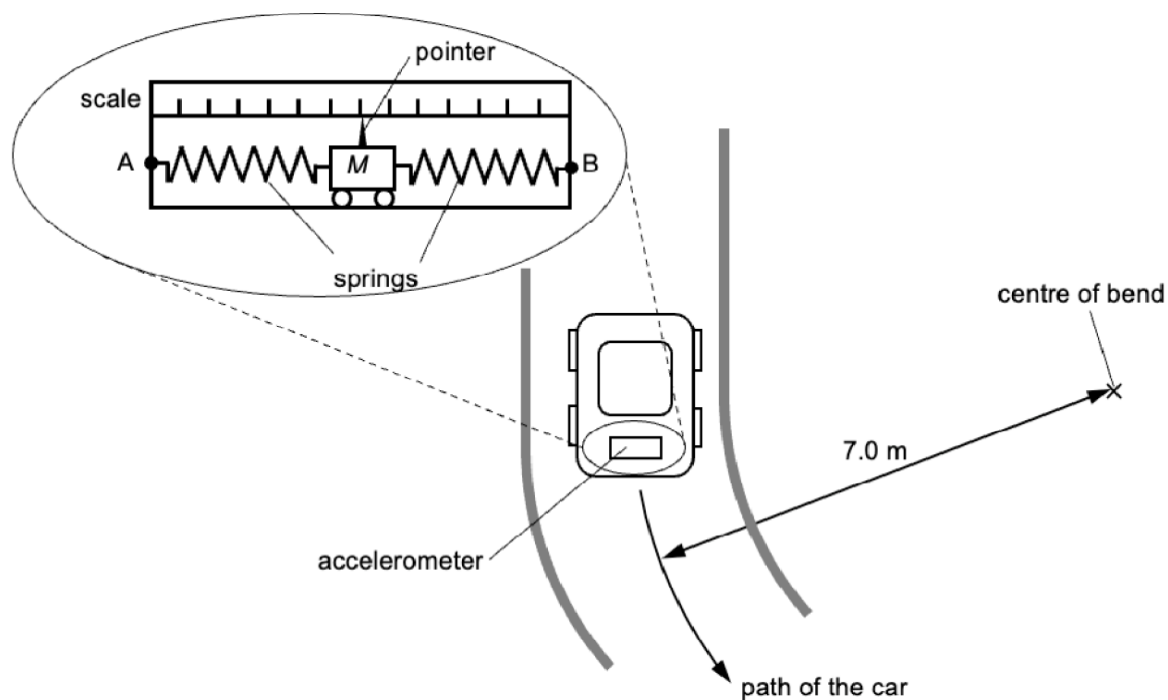..

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(b) Fig. 1.1 shows the construction of a simple accelerometer that is used to measure the centripetal acceleration of a car turning into a corner.

Fig. 1.1 (not to scale)

The two ends A and B of the accelerometer are fixed to the car. A mass M is connected to two identical springs and it moves between A and B with negligible friction. A pointer attached to M indicates the acceleration of the car.

The car enters the corner at a speed of 25 km h^{-1}. The radius of the path of the car is 7.0 m.

(i)   Determine the centripetal acceleration of the car.

centripetal acceleration = …………………….…………… m s^{-2} [2]

(ii) The mass *M* between the springs in the accelerometer is 0.50 kg. A test shows that a force of 1.0 N moves the pointer by 5.0 mm from its equilibrium position.

Determine the displacement of the pointer from the equilibrium position when the car is turning into the corner.

displacement = …………………….…………….. mm [2]

(iii) End B is nearer to the centre of the bend compared to A. Explain, in terms of forces exerted by the springs, whether the pointer of the accelerometer moves towards end A or B.

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