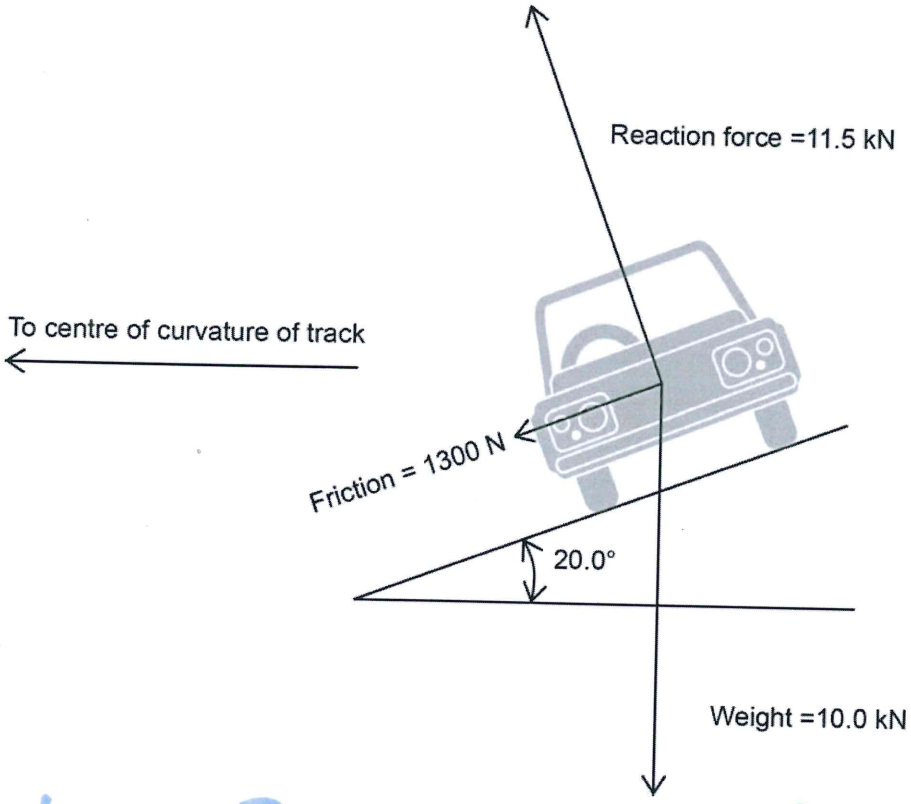
Exam Questions
Chapter 1·4 - Circular Motion
Question 1 2011:1:12

(5 marks)

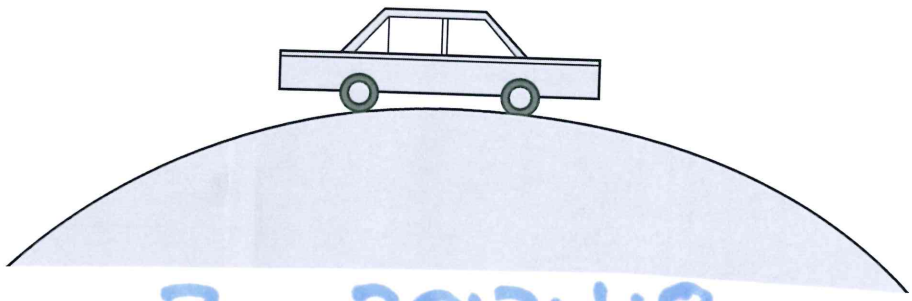
The diagram below shows the forces acting on a car following a curve on a banked track. The car is travelling at 17.0 m s^{-1} without slipping. Calculate the radius of the track.



Question 2 2013:1:6

(3 marks)

A car is driving over a hill with a radius of 250 m at a speed of 30.0 m s^{-1}. Determine the magnitude of the net force experienced between a 65.0 kg passenger and their seat or seat belt.



Question 3 2013:1:9

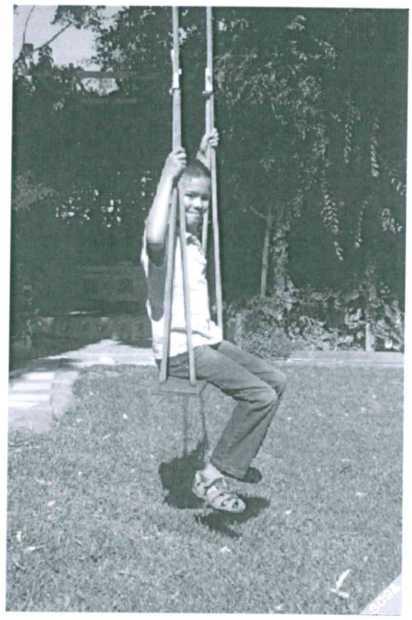
(5 marks)

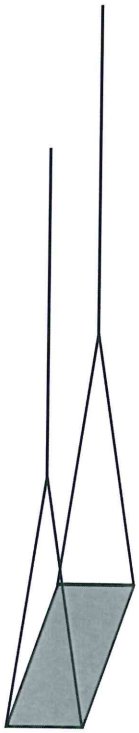
Use a labelled free body diagram to help explain why a runner or a cyclist needs to lean when making a turn.

Exam Questions
Chapter 1·4 - Circular Motion
Question 4 2014:1:11

(6 marks)

Shown are a photograph and diagram of a child's swing suspended 7.00 metres below the branch of a large tree. The wooden seat has a mass of 1.00 kg and is supported by ropes as shown in the diagram below. When the seat is horizontal, the ropes that **attach to the seat** each make an angle of 15.0° to the vertical.



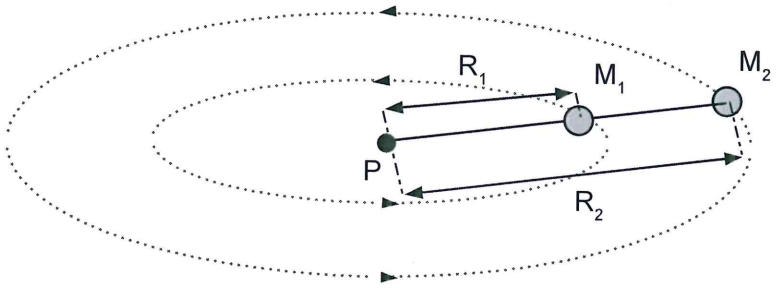


Calculate the maximum tension in each of the angled sections of the rope that attach to the seat when a 27.0 kg boy is sitting on the swing and moving with a tangential velocity of 4.00 m s^{-1}. Show **all** workings.

Question 5 2014:2:19

(10 marks)

A string linking two balls M_1 and M_2, (shown in the figure below) allows them to revolve in circular motion on the horizontal plane with radii R_1 and R_2. The periods of revolution of M_1 and M_2 are the same and equal to T. Ignore gravitational force and air resistance force.



(a) Draw a free body diagram for M_1. (3 marks)

EXAM QUESTIONS
Chapter 1·4 - Circular Motion
Question 5: continued

(b) Complete the following for M_1 and M_2.

(i) Write an appropriate expression for the tangential velocity v_1 of M_1 in terms of R_1, R_2 and T. (2 marks)

(ii) Write an appropriate expression for the tension F_1 acting in the string between M_1 and M_2, in terms of the mass m_2, the radius R_2 and the period T. (2 marks)

(iii) Write an appropriate expression for the tension F_2 acting in the string between P and M_1, in terms of the masses m_1 and m_2, the radii R_1 and R_2 and the period T. (3 marks)