

Topic 24: Exercises on Motion on a Banked Track
Level 2

1. At what speed should a car travel round a bend of radius 80 m which is banked at an angle of 10° .

11.8 m s^{-1}

2. A bend on a racetrack is designed with variable banking so that cars on the inside can corner at 80 kmh^{-1} and those on the outside can corner at 160 kmh^{-1} , in both cases without any tendency to slip. If the inner radius is 200 m and the outer radius is 220 m , find the difference between the angles of banking at the inside and the outside of the track.

28.4°

3. A railway line is taken round a circular bend of radius 1000 m . The distance between the rails is 1.5 m . At what height above the inner rail should the outer rail be raised in order to eliminate lateral thrust for an engine travelling at a speed of 40 kmh^{-1} round the bend?

18.9 mm

4. A railway line has been constructed around a circular curve of radius 500 m . The distance between the rails is 1.5 m and the outside rail is 0.1 m above the inside rail. Find the speed that eliminates a sideways force on the wheels for a train on this curve. (Take $g = 9.8\text{ ms}^{-2}$.)

18.1 ms^{-1}