

NCERT/CBSE PHYSICS CLASS 11 textbook

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Answers to NCERT/CBSE PHYSICS Class 11(Class XI)textbook Additional exercise

CHAPTER FIVE Laws of Motion

EXERCISES

(For simplicity in numerical calculations, take $g = 10 \text{ m s}^{-2}$)

5.31 A train runs along an unbanked circular track of radius 30 m at a speed of 54 km/h. The mass of the train is 10^6 kg. What provides the centripetal force required for this purpose – The engine or the rails ? What is the angle of banking required to prevent wearing out of the rail ?

5.31

Solution:

Radius of bend, $r=30 \text{ m}$

Speed of train= $54 \text{ kmh}^{-1}=15 \text{ms}^{-1}$

Mass of train, $m=10^6 \text{ kg}$

Let the angle of banking be θ .

The required force is provided by the reaction due to outer rail, not by the engine.

The angle of banking is ,

$$\theta = \tan^{-1}\left(\frac{v^2}{rg}\right) = \tan^{-1}\left(\frac{15^2}{30 \times 9.8}\right) = 37.42^\circ$$

Please do not copy the answer given here

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