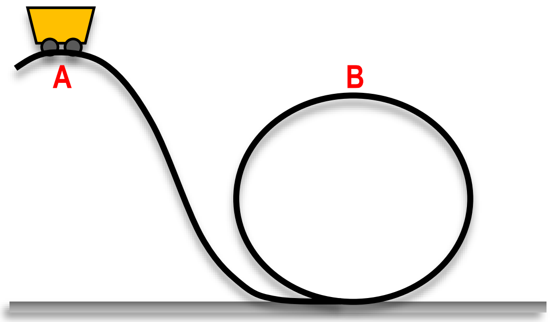
CONCEPT: ROLLERCOASTER PROBLEMS

● Most rollercoaster problems involve objects moving in curved AND/OR circular paths, which we know how to solve!

- You'll solve Circular path problems using **ΣF=ma** or **Energy**, depending on the given/target variables:

For example:
- "What speed must you have at **B** so you don't fall at **B**?" → 1 point → Use **[ΣF=ma | Energy]**
- "What height must you have at **A** so you don't fall at **B**?" → 2 points → Use **[ΣF=ma | Energy]**

EXAMPLE: A rollercoaster cart without seat belts goes around a loop-de-loop of radius **R = 5m.** Calculate:



CONSERVATION OF ENERGY
1) Draw Diagram **2)** Write Cons. of Energy EQ **3)** Eliminate & expand terms **4)** Solve

Circ. Motion / Centripetal Forces
$a_C = \frac{v_T^2}{R} = \frac{4\pi^2 R}{T^2} = 4\pi^2 R f^2$
$T = \frac{1}{f} \Leftrightarrow f = \frac{1}{T}$
$v_T = \frac{C}{T} = \frac{2\pi R}{T} = 2\pi R f$

a) the minimum speed the cart needs at point **B** so that any passengers *would not fall*

b) minimum height the cart needs at point **A** so that it reaches point **B** with the minimum speed found

● When solving for the *minimum height* of a point needed to reach another, we assume v = __, so K = __.

● The Height of the LOOP is ________ the radius: H_{Loop} = _____

PROBLEM: A cart goes around a loop-de-loop of radius R. If the cart stays locked to the tracks, derive an expression for the minimum speed required at the bottom of the loop in order for the cart to just barely reach the top.