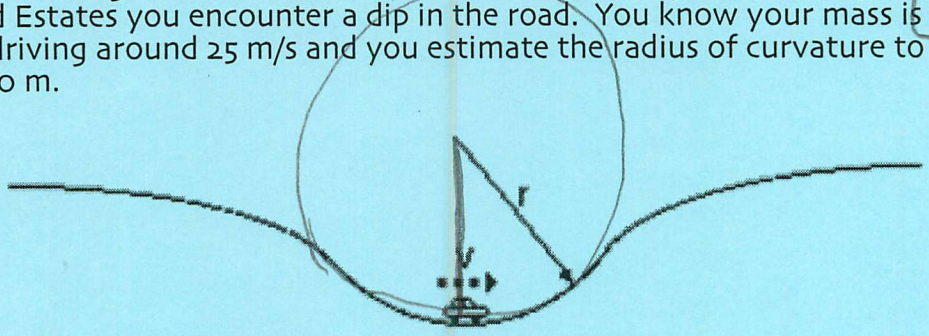
$\Sigma F = F_{centripetal}$

$\Sigma F = m \cdot a_c$

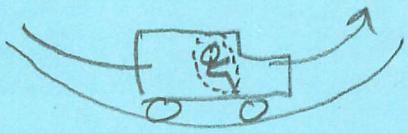
$a_c = \frac{v^2}{r}$

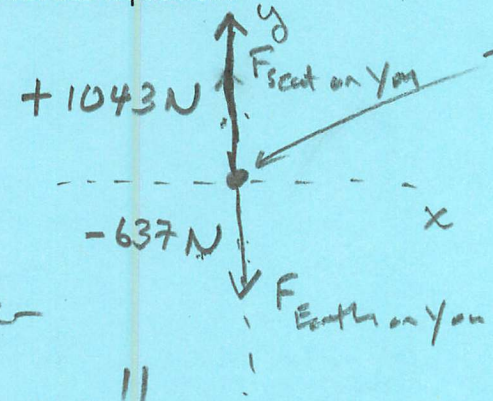
Practice Problem

1. You are driving from Summit Road to school along Highway 17. Right around Redwood Estates you encounter a dip in the road. You know your mass is 65 kg, you are driving around 25 m/s and you estimate the radius of curvature to be about 100 m.



a. Draw a force diagram for you as you sit in your seat driving through the dip. Be sure to include a sum of the forces equation.





that's you!

1. Long Range Force
   - Earth on you
2. Contact Forces

Net Force is towards the center of rotation so the upward force is longer!!

b. What is your centripetal acceleration?

$a_c = \frac{v^2}{r}$ ← radius of curvature

$a = \frac{v^2}{r} = \frac{(25\ m/s)^2}{100\ m} = 6.25\ m/s^2$

(upward because it is positive!)

c. What is your centripetal force?

** ΣF is the centripetal force

$\Sigma F = m \cdot a$

$= (65\ kg)(6.25\ m/s^2) = 406\ \frac{kg \cdot m}{s^2} = 406\ N$

d. How much force does the seat exert on you as you drive through the dip?

$\Sigma F_y = F_{earth\ on\ you} + F_{seat\ on\ you}$

$406\ N = -637\ N + F_{seat\ on\ you}$

$+637\ N \quad +637\ N$

$1043\ N = F_{seat\ on\ you}$

$F_{Earth} = \left(-9.8\ \frac{N}{kg}\right) mass$

$= \left(-9.8\ \frac{N}{kg}\right)(65\ kg)$

$F_{Earth} = -637\ N$