Acceleration is the change in velocity

3 ways to do it:

1) Speed up

2) Slow down

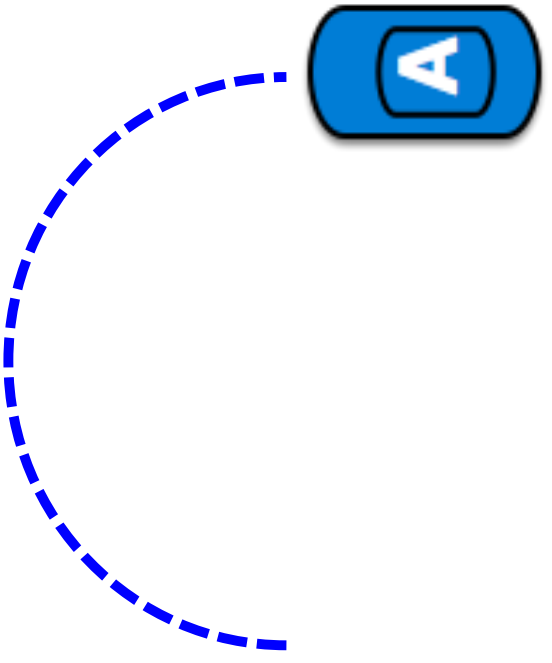
3) ??

Turning acceleration = **Centripetal acceleration**

An acceleration that does not change your speed; only your direction

Which way does it act?

What is its direction?



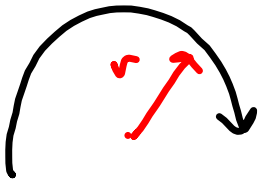
Which situation creates a more violent turn?
(more centrip accel)

Go into a turn fast

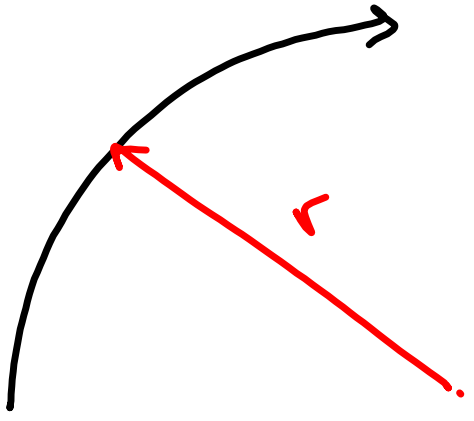
Go into a turn slow

Which situation creates a more violent turn?
(more centrip accel)

Go into a tight turn

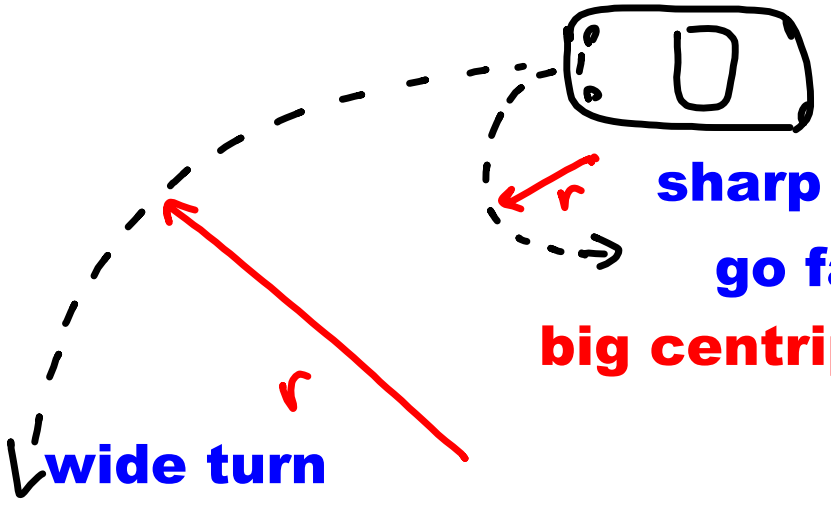


Go into a wide turn



Centripetal Acceleration

(accel due to turning)



sharp turn

go fast

big centrip accel

wide turn

go slow

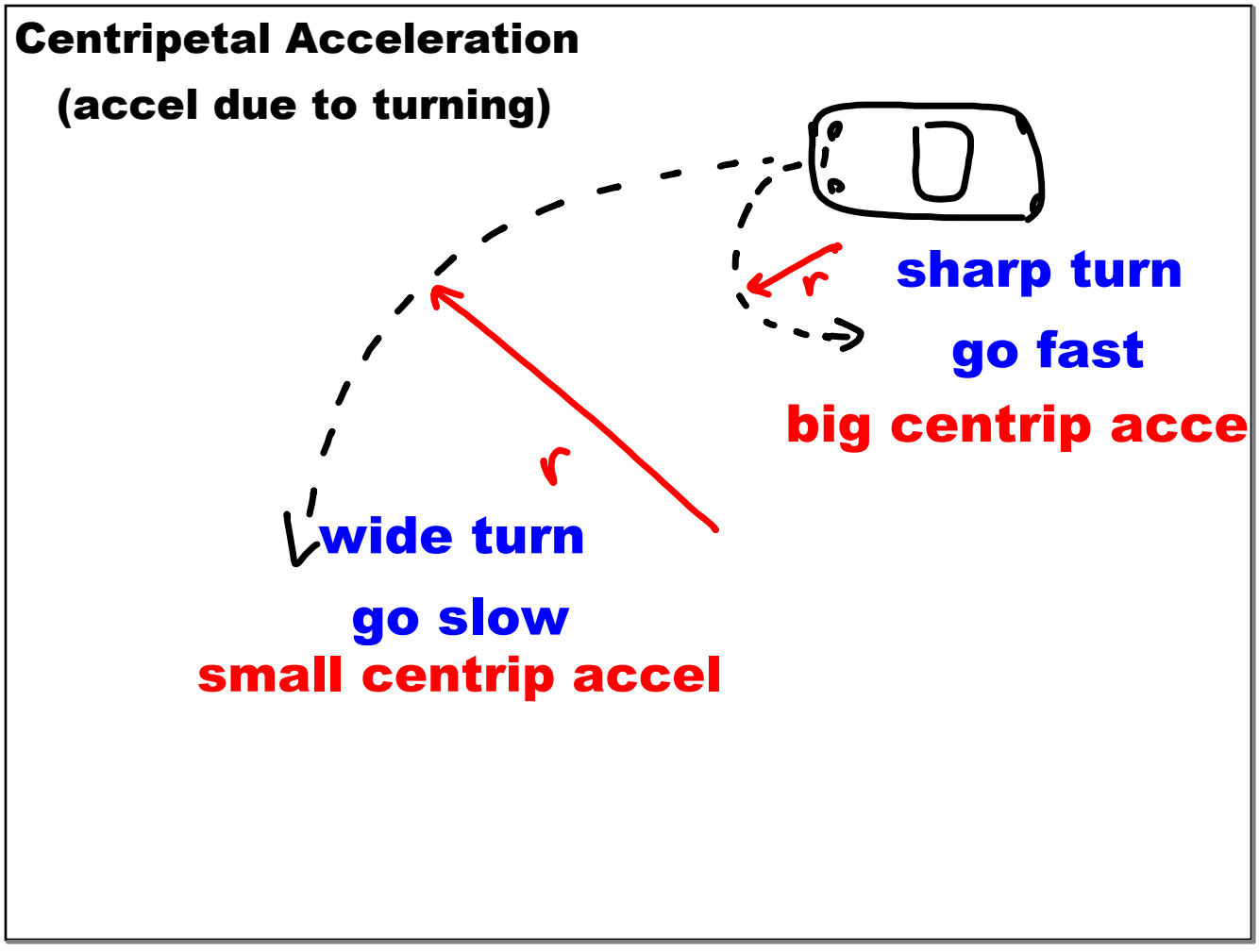
small centrip accel

Centripetal Acceleration Equation?

$$a_c = \frac{V_T}{r}$$

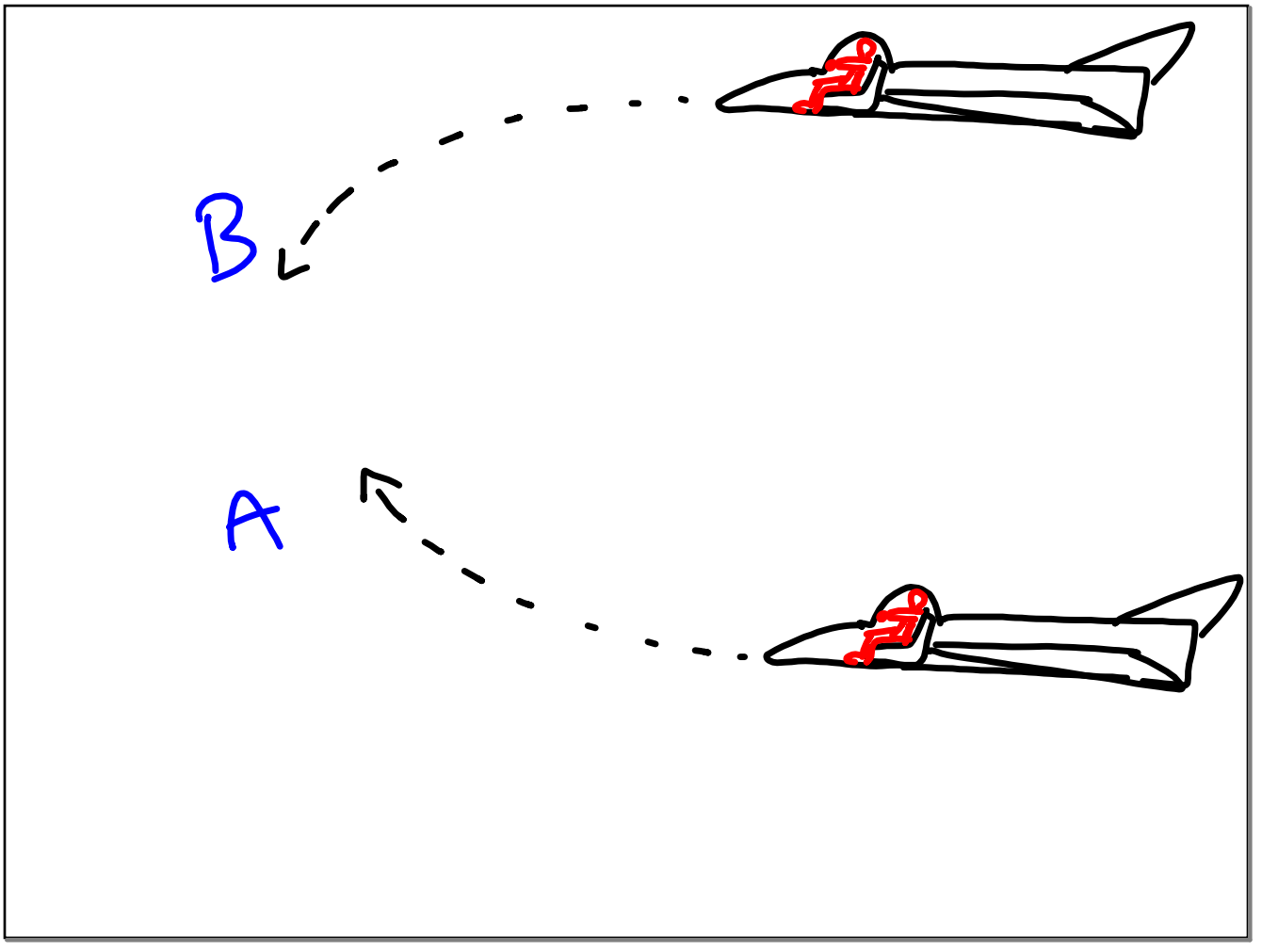
Centripetal Acceleration

(accel due to turning)

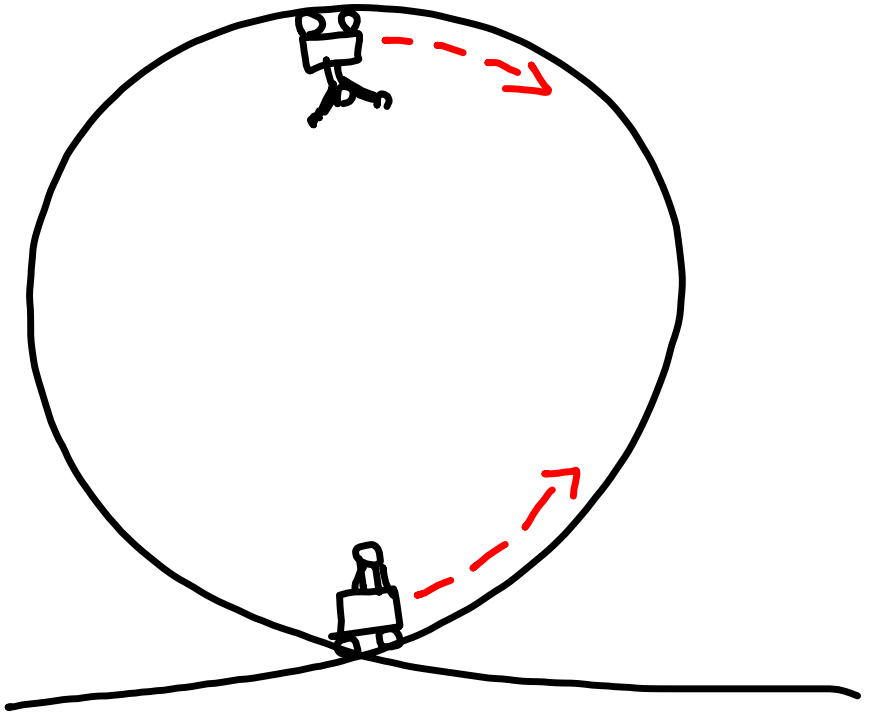


Coaster Loops & Pilots

g's

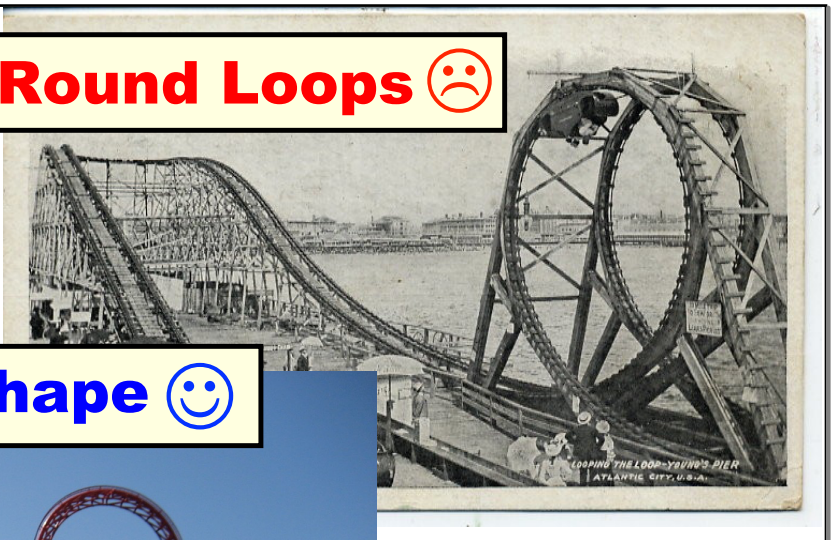

B
A

Top of loop: danger of falling in



Bottom of loop: Danger of ???

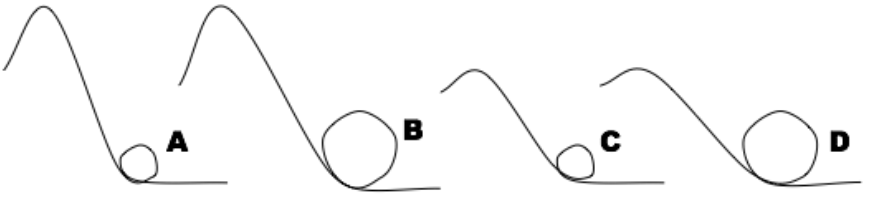
Round Loops ☹



Tear drop shape ☺

4. Centripetal Acceleration

1. Four coasters are shown at right. In their loops, which coaster has…



LEAST centrip acceleration?
LEAST possibility of hurting riders?

Illustrate why by resizing the variables in the equation.

GREATEST centrip acceleration?
GREATEST possibility of hurting riders?

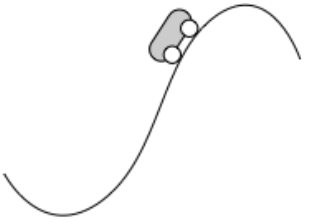
Illustrate why by resizing the variables in the equation.

2. The first coasters had circular loops. Now they have a teardrop shape.

What is true of the radius at the bottom?
Why is that safer?

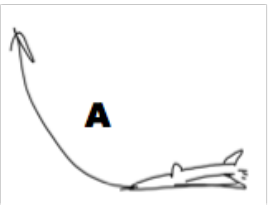
What is true of the radius at the top?
Why is that not dangerous?

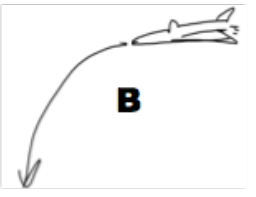
1. On a roller coaster…
   a) Where do you feel the most pressed into your seat?



   b) Where do you feel as if you are coming up out of your seat?

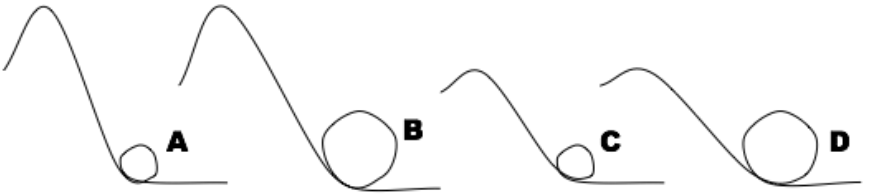
4. Which pilot is more in danger of blacking out? Why?





4. Centripetal Acceleration

1. Four coasters are shown at right. In their loops, which coaster has...



LEAST centrip acceleration?
LEAST possibility of hurting riders? **D**

Illustrate why by resizing the variables in the equation.

$$\frac{v_T^2}{r}$$

GREATEST centrip acceleration?
GREATEST possibility of hurting riders?

Illustrate why by resizing the variables in the equation.

$$\frac{v_T^2}{r}$$

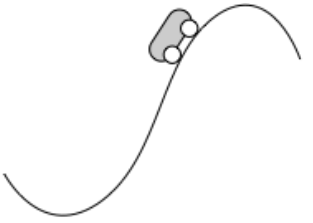
2. The first coasters had circular loops. Now they have a teardrop shape.

What is true of the radius at the bottom?
Why is that safer? larger, decreases the centrip accel

What is true of the radius at the top?
Why is that not dangerous? smaller r, but you're going slower at the top

1. On a roller coaster…
   a) Where do you feel the most pressed into your seat?

Bottoms of hills



b) Where do you feel as if you are coming up out of your seat?

Tops of hills

4. Which pilot is more in danger of blacking out? Why?

A - going up against gravity, the blood ends up getting left behind.