Today:

Chapter 8 – Circular Motion

Irish Phrasebook

Odious – *Adjective to mean really good or really bad depending on how it's said*

Announcements

- Grade updates:
  - Exam and Ch 5 On-paper back Wednesday
  - Ch 6&7 On-paper back Friday
  - Overall grade update by Friday

- Reading assignments:
  - Reading Q's for Ch 9 due tomorrow
  - Reading Q's for Ch 10 due Thursday 12th

- HW assignment:
  - LON-CAPA HW for Ch8 due Fri.

Hitting a ball so it moves in a circle - Observation experiment

Centripetal Force

When objects are moving in a circle, the net force toward the center is often referred to as a "centripetal force" (force toward the center)

You are driving in your car and you make a quick left hand turn, which way do you “feel pushed”?

A. Left
B. Right
C. Something else

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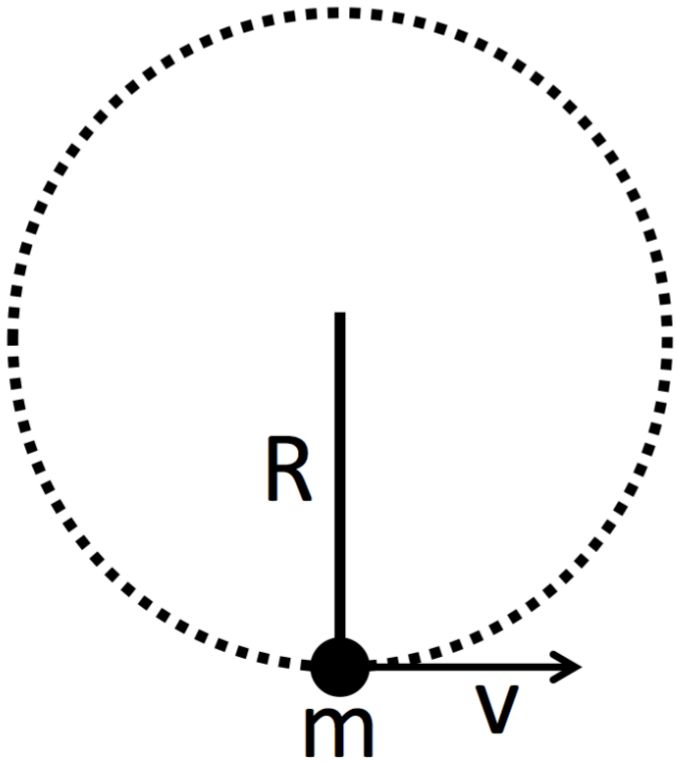
This is a result of centrifugal force (or the force that I feel as a result of the centripetal force).

Centripetal Force

- When objects are moving in a circle, the net force toward the center is often referred to as a "centripetal force" (force toward the center)
- There's also this term "centrifugal force" (away from center)
  - This is result of change of reference frame

A rock (mass, m) is swung in a vertical circle (radius, R) on the Earth. At the bottom of the swing, the rock is moving at a speed v. True or false, at this location the force exerted on the rock by the rope is equal to mv^2/R.

A. True
B. False



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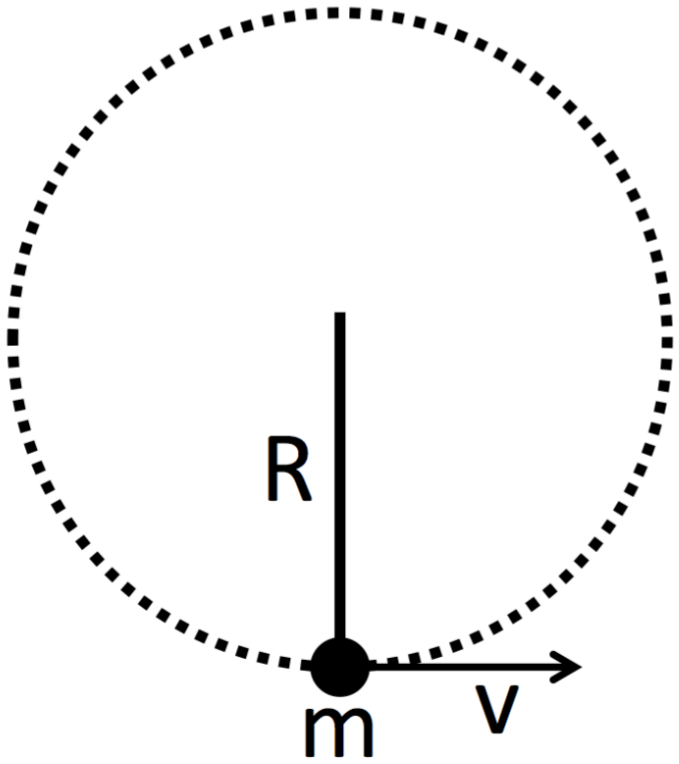
The sum of the forces at this point are F^T-F^g which is equal to mv^2/R, so the F^T is actually $mg + mv^2/R$



A ladybug is clinging to the rim of a spinning wheel which is spinning CCW and is speeding up. At the moment shown, when the bug is at the far right, what is the approximate direction of the ladybug's acceleration?

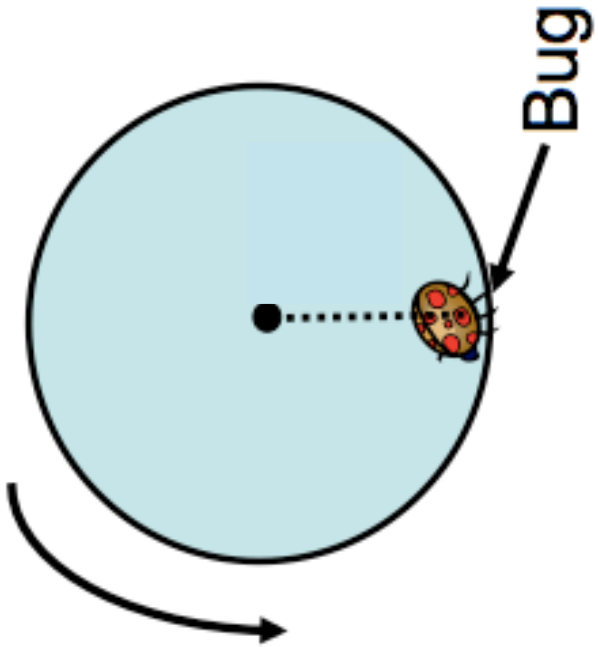
A. ↙

B. ↑

C. →

D. ←

E. ↖



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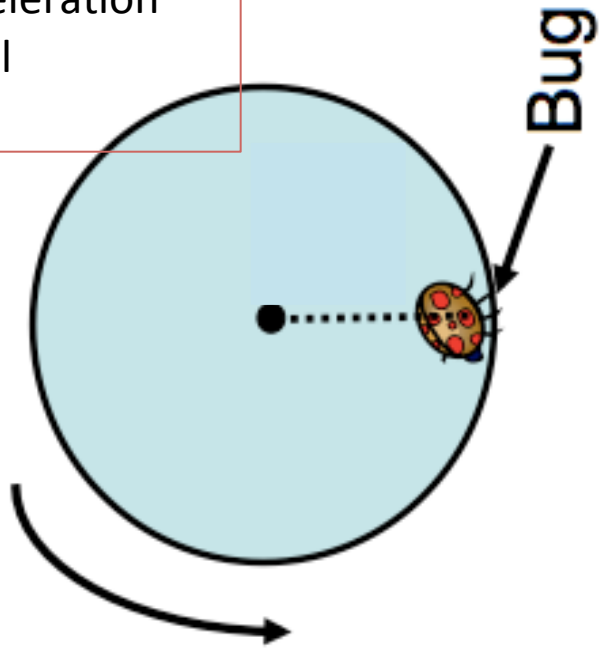
It's the combination of a centripetal acceleration and a tangential acceleration.



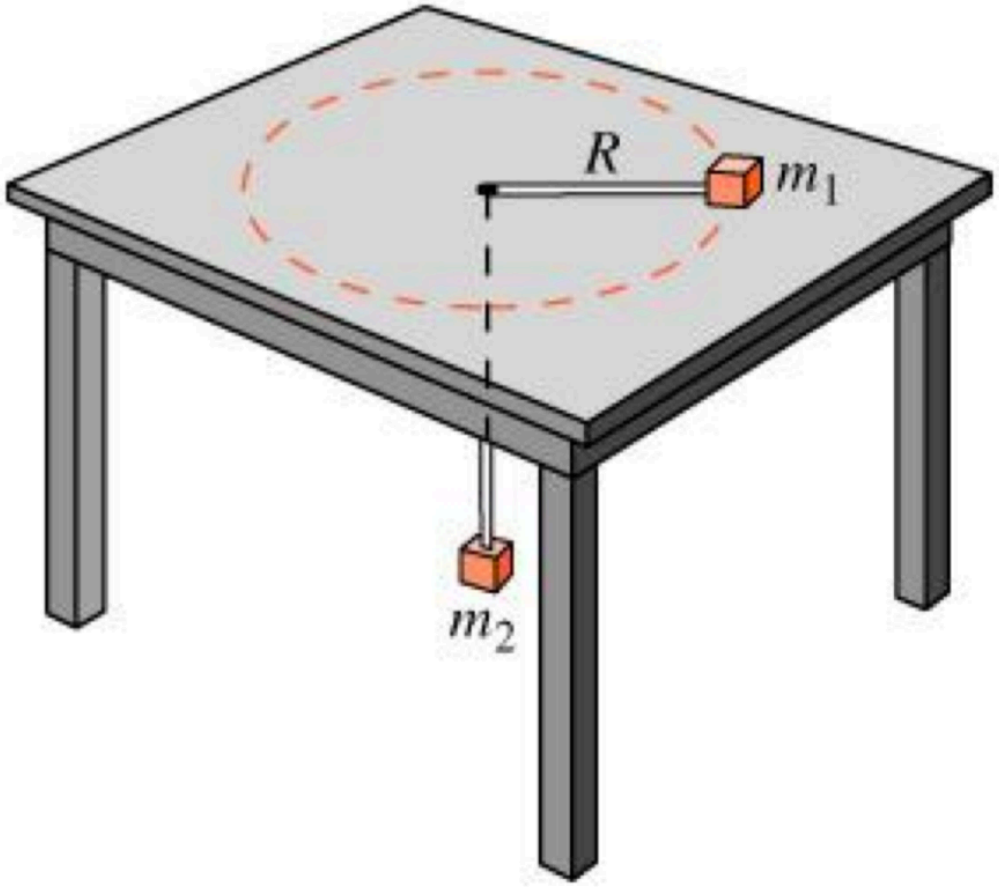
Circular Motion

- There's a component of the acceleration that is always toward the center in order for the motion to be circular
- There's another that is present if the motion increases/decreases
  - Comes from Newton's second law

Example: Uniform Circular Motion

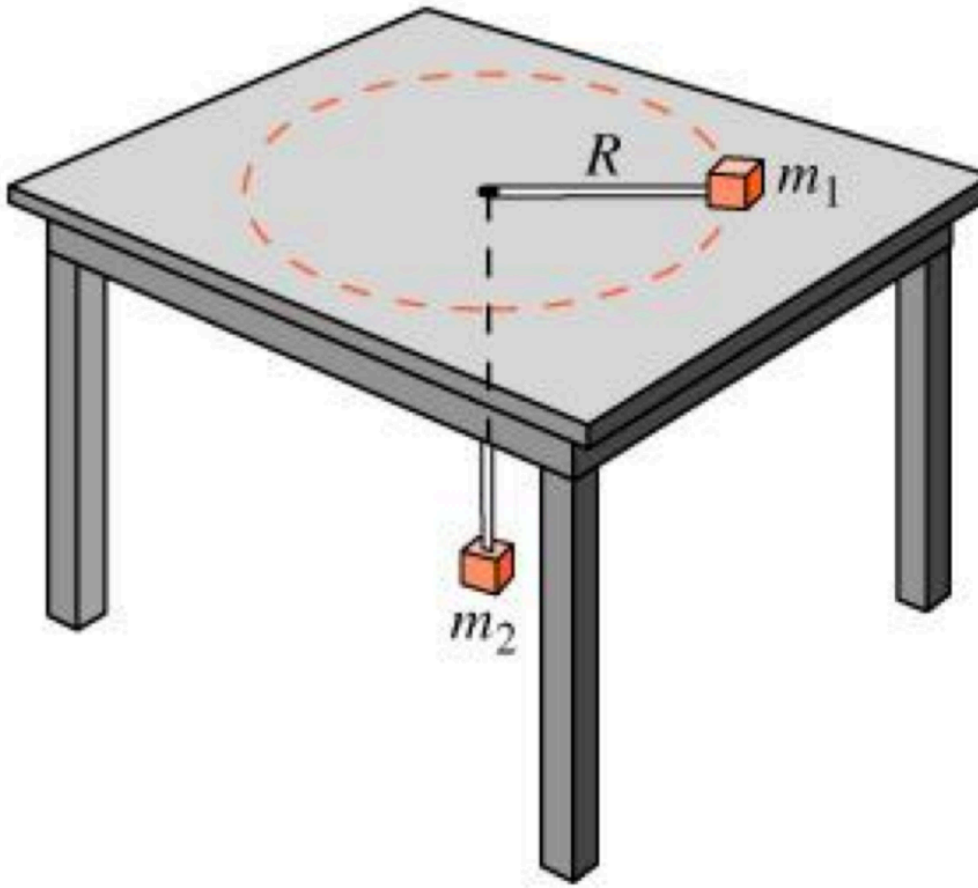
An object (mass, m1) slides on a horizontal frictionless table. It is tied to an object of mass m2, which is under the table. The string is fed through a hole in the table.

What is the speed needed to keep the mass from falling down?



Example: Uniform Circular Motion
Where do we start?

A. Find the right kinematic equation
B. Use the circular motion equations
C. Draw the free body diagram
D. Something else



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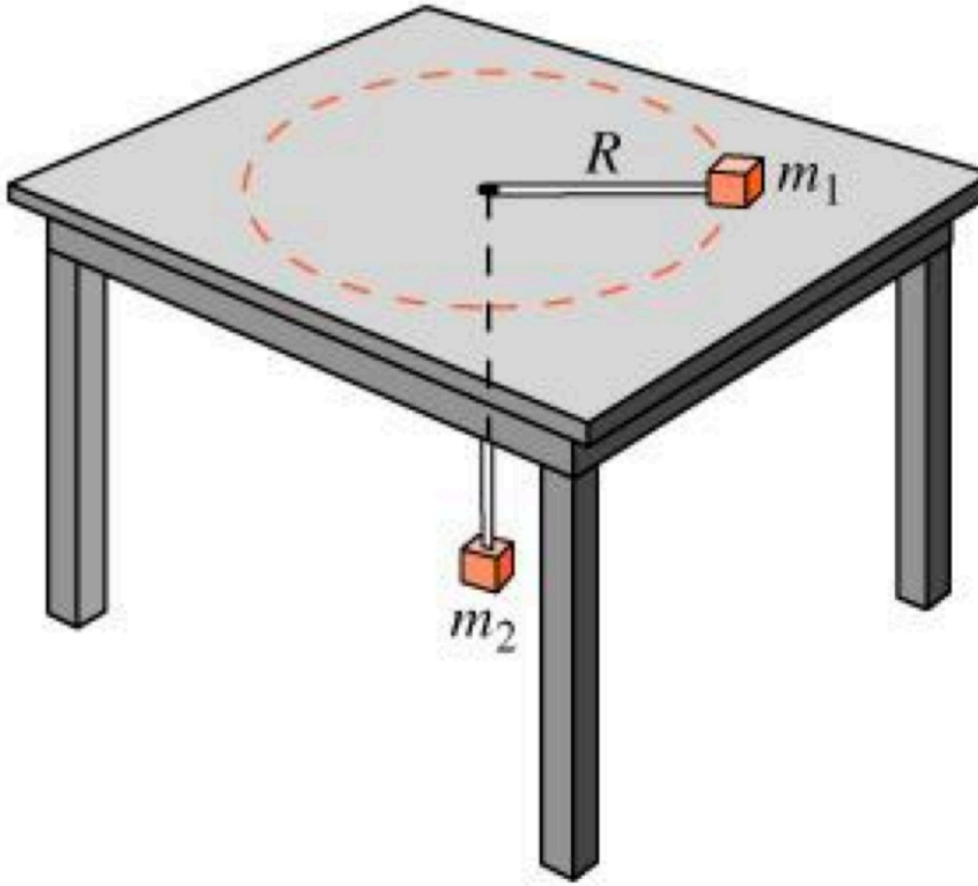
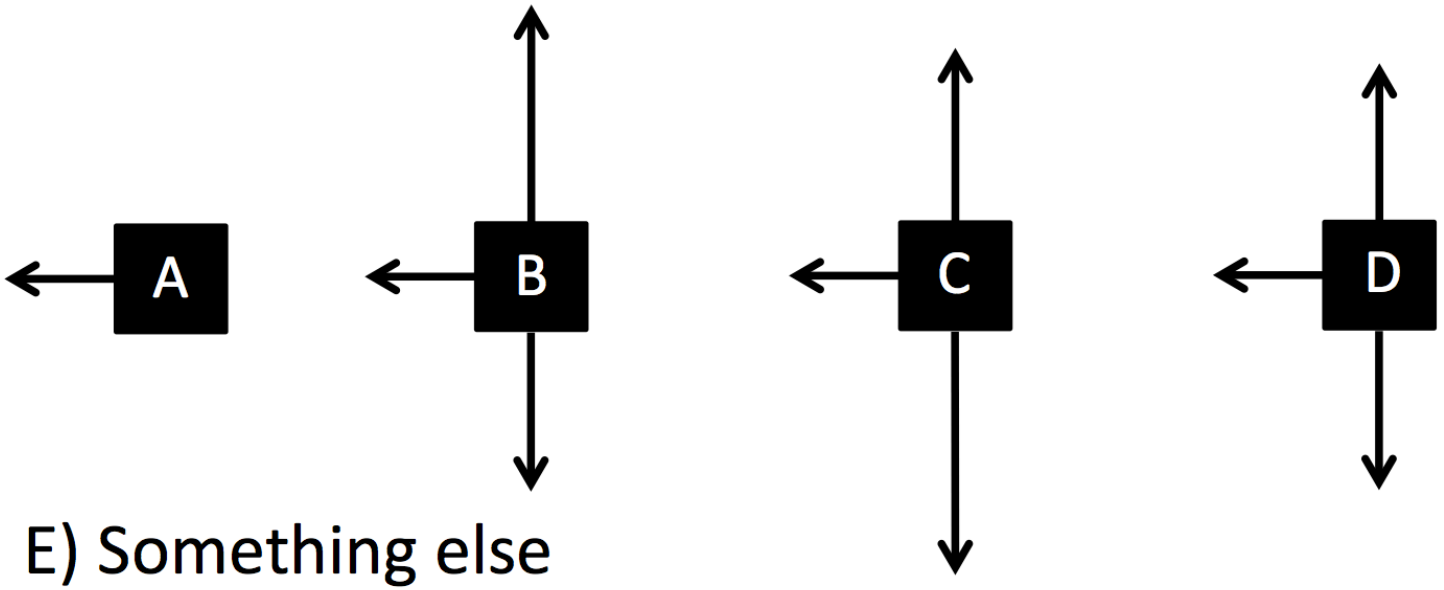


Which is the correct FBD for mass 1 (on the table)?

(Note: I've left the labels off)



E) Something else

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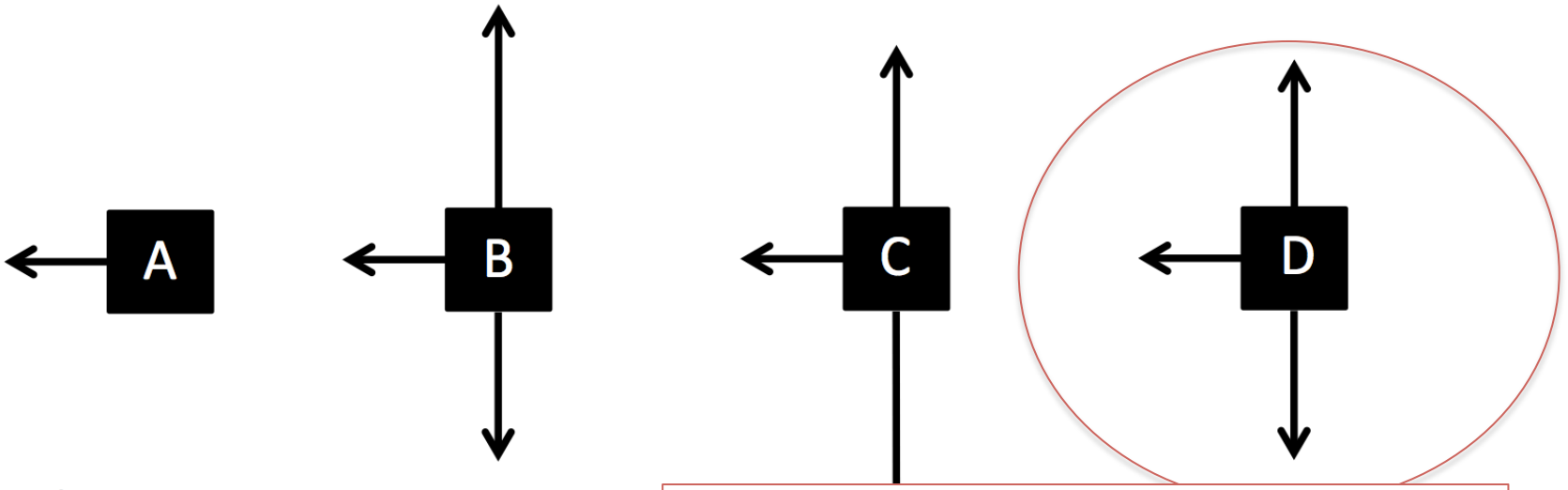

E) Something else

See the solution for this problem in the handwritten notes