

Quiz #6: Dynamics II: Motion Along a Plane

Problem 1 (1.5 points)

A stone is tied to a 0.50-m string and whirled at a constant speed of 4.0 m/s in a vertical circle. Its acceleration at the top of the circle is:

- a) 9.8 m/s^2 , up
- b) 9.8 m/s^2 , down
- c) 8.0 m/s^2 , down
- d) 32 m/s^2 , up
- e) 32 m/s^2 , down

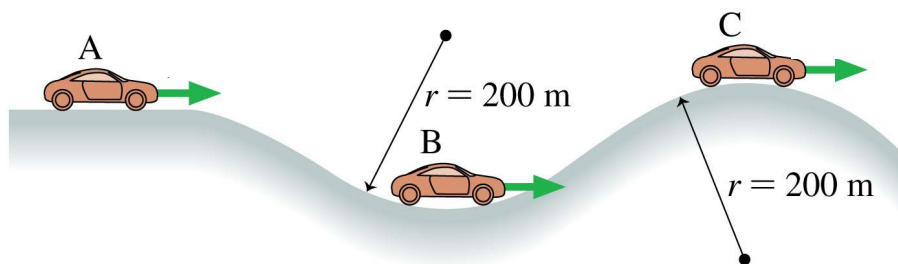
Problem 2 (1.5 points)

A car goes around a curve of radius r at a constant speed v . Then it goes around a curve of radius $2r$ at speed $2v$. What is the centripetal force on the car as it goes around the second curve, compared to the first?

- a) four times as big
- b) twice as big
- c) one-half as big
- d) one-fourth as big
- e) the same

Problem 3 (2 points)

In the figure below, suppose that the car is speeding up as it passes through point B and slowing down as it passes through point C. In what direction does the total acceleration vector point at points B and C? Answer in terms of a quadrant (I, II, III, or IV) and justify your answer.



a) Point B:

b) Point C

Problem 4 (5 points)

In an amusement park ride called The Roundup, passengers stand inside a 16-m-diameter rotating ring. After the ring has acquired sufficient speed, it tilts into a vertical plane, as shown in the figure below. **(a)** Suppose the ring rotates once every 4.5 s. If a rider's mass is 55 kg, what is the normal force on the rider at the top of the ride? **(b)** What is the longest period the ring can have without the riders falling off at the top?

