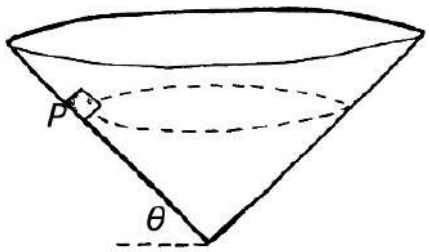
NAME _____ DATE _____

Scenario

Consider a cone made of a material for which friction may be neglected. The sides of the cone make an angle θ with the horizontal plane. A small block is placed at point P. In Case 1, the block is released from rest and slides down the side of the cone toward the point at the bottom. In Case 2, the block is released with initial motion so that the block travels with constant speed along the dotted circular path.



Data Analysis

PART A: In Case 1, the block is released from rest. Is the block accelerating?

_____ Yes _____ No

Explain, and if yes, determine the direction of the acceleration.

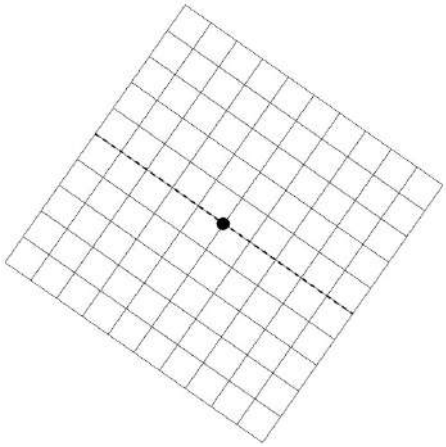
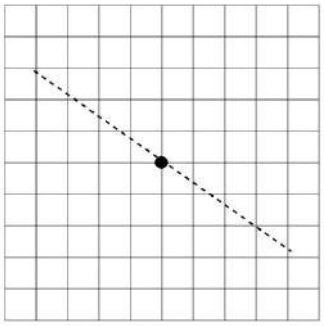
In Case 2, the block is released so that it travels with a constant speed along the dotted circular path. Is the block accelerating?

_____ Yes _____ No

Explain, and if yes, determine the direction of the acceleration.

Using Representations

PART B: In both diagrams below, the weight F_g of the block is drawn. Draw the normal force exerted in each case on the corresponding diagram. Use the grids provided to make each normal force have the proper length. (In each case, breaking one of the forces into components will help you find the direction of the acceleration.)

Case 1	*Case 2*
	

Quantitative Analysis

PART C: Derive an expression for the magnitude of the normal force exerted on the object in each case in terms of F_g, θ, and physical constants as necessary.

Case 1	*Case 2*

PART D: Use the diagrams in Part B to explain why the normal force is greater in Case 2. Then use your equations in Part C to explain why the normal force is greater in Case 2.