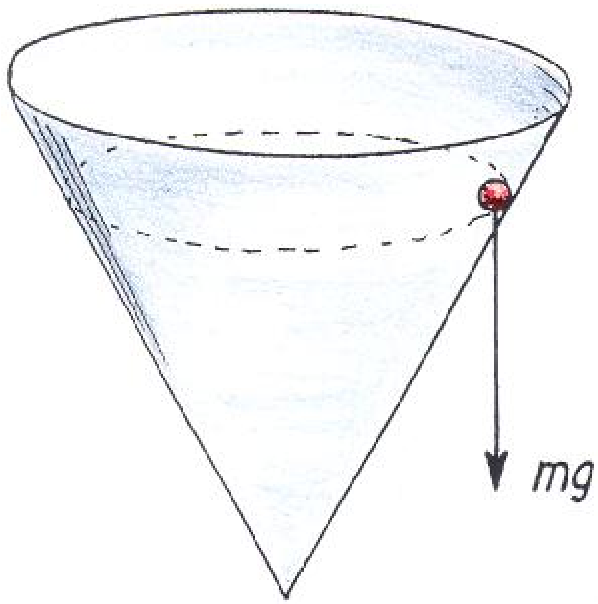
NEXT-TIME QUESTION

The ball moves at constant speed along a horizontal circle inside a friction-free cone. The weight of the ball is shown by the weight vector *mg*.



QUESTIONS:

1. What other significant force(s) act on the ball?
2. What is the direction of the net force on the ball?
3. How does the magnitude of the normal force (not shown) compare with *mg*?

Next-Time Question

Conceptual Physics

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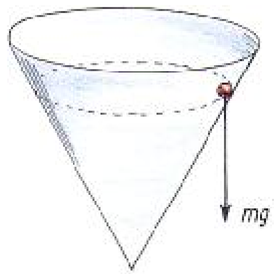
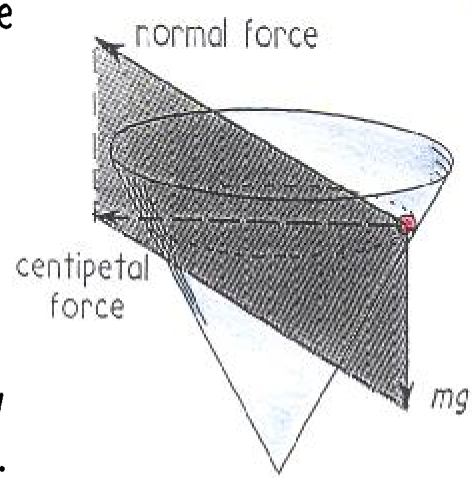


QUESTIONS:
1. What other significant force(s) act on the ball?
2. What is the direction of the net force on the ball?
3. How does the magnitude of the normal force (not shown) compare with *mg*?

Answers:

Only one other force acts on the ball—that provided by the inner surface of the cone—the *normal force*. One of the rules for any body moving in a circle at constant speed is that the net force on that body must act along the radial direction, toward the center of rotation. This is the *centripetal force*. Another rule is that the magnitude of a normal force that holds a body in uniform circular motion is always greater than *mg*. We see this with yet another rule, the parallelogram rule (the resultant of a pair of vectors lies along the diagonal of the parallelogram described by the vectors). The resultant (dashed vector) provides the centripetal force.



Also, since the motion is horizontal, $\Sigma F_y = 0$, which means the vertical component of the normal force has a magnitude *mg*. For this 60° cone, we see the normal is twice the magnitude of *mg*.

Glider pilots know that in steep 60-degree banks they're pulling two g's. The normal force on the sitting pilot is twice the pilot's weight.

Hewitt Drew it!

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