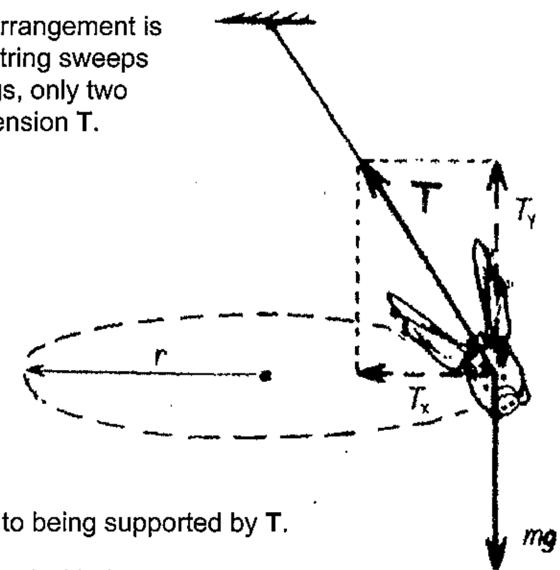
Name ______________________________ Date ____________

CONCEPTUAL Physics PRACTICE PAGE

Chapter 8 Rotational Motion
The Flying Pig

The toy pig flies in a circle at constant speed. This arrangement is called a conical pendulum because the supporting string sweeps out a cone. Neglecting the action of its flapping wings, only two forces act on the pig—gravitational m**g**, and string tension **T**.



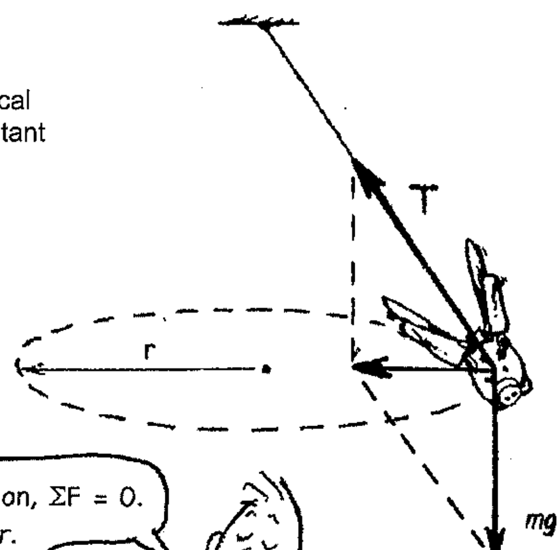
Vector Component Analysis:
Note that vector **T** can be resolved into two components—horizontal T_x and vertical T_y. These vector components are dashed to distinguish them from the tension vector **T**.

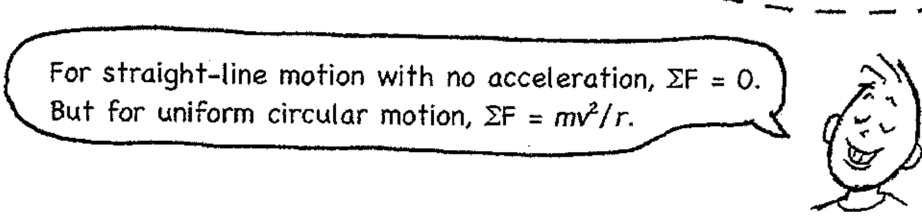
Circle the correct answers.

1. If **T** were somehow replaced with T_x and T_y the pig [would] [would not] behave identically to being supported by **T**.
2. Since the pig doesn't accelerate vertically, compared with the magnitude of m**g**, component T_y must be [greater] [less] [equal and opposite].
3. The velocity of the pig at any instant is [along the radius of] [tangent to] its circular path.
4. Since the pig continues in circular motion, component T_x must be a [centripetal] [centrifugal] [nonexistent] force, which equals [zero] [mv^2/r]. Furthermore, T_x is [along the radius] [tangent to] the circle swept out.

Vector Resultant Analysis:

5. Rather than resolving T into horizontal and vertical components, use your pencil to sketch the resultant of m**g** and **T** using the *parallelogram rule*.
6. The resultant lies in a [horizontal] [vertical] direction and [toward] [away from] the center of the circular path. The resultant of m**g** and **T** is a [centripetal] [centrifugal] force.



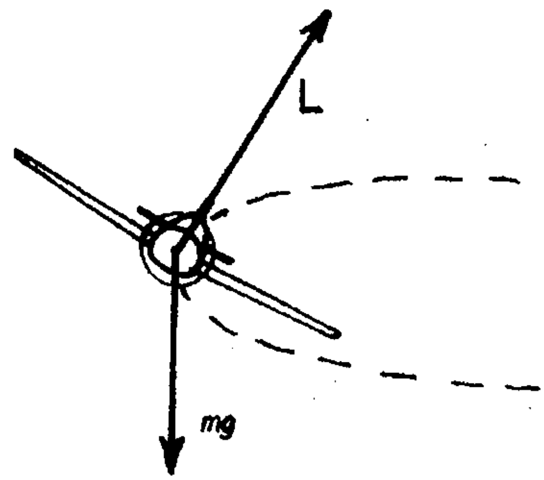


thanx to Pablo Robinson and Miss Piggy

Chapter 8 Rotational Motion
Banked Airplanes

An airplane banks as it turns along a horizontal circular path in the air. Except for the thrust of its engines and air resistance, the two significant forces on the plane are gravitational **mg** (vertical), and lift **L** (perpendicular to the wings).

Vector Component Analysis:
With a ruler and a pencil, resolve vector **L** into two perpendicular components, horizontal L_x and vertical L_y. Make these vectors dashed to distinguish them from **L**.



Circle the correct answers.

1. The velocity of the airplane at any instant is

   [along the radius of] [tangent to] its circular path.

2. If **L** were somehow replaced with L_x and L_y,

   the airplane [would] [would not] behave the

   same as being supported by **L**.

3. Since the airplane doesn't accelerate vertically, component L_y must be

   [greater than] [less than] [equal and opposite to] **mg**.

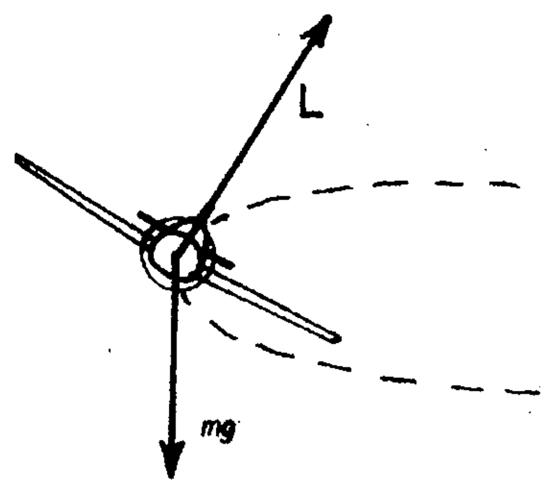
4. Since the plane continues in circular motion, component L_x must equal [zero] [mv^2/r]

   and be a [centripetal] [centrifugal] [nonexistent] force. Furthermore, L_x is

   [along the radius of] [tangent to] the circular path.

Vector Resultant Analysis:

5. Rather than resolving **L** into horizontal and vertical components, use your pencil to sketch the resultant of mg and **L** using the *parallelogram rule*.



6. The resultant lies in a [horizontal] [vertical]

   direction and [toward] [away from] the center

   of the circular path. The resultant of mg and **L** is a

   [centripetal] [centrifugal] force.

7. The resultant of **mg** and **L** is the same as [L_x] [L_y].

Challenge: Explain in your own words why the resultant of two vectors can be the same as a single component of one of them.

Hewitt Drew it!