Ch 4 Lab Circular Motion

Purpose: to review the motion in a conic circle, illustrate how centripetal force is caused for horizontal circles and vertical circles, and to show the relationships between variables and Fc.

Part I Conic Circles

1) Using the helicopter at the front of the class measure and record the length of the string supporting it.
2) Use the centigram balance to measure and record the mass of the helicopter in kilograms.
3) Switch on the helicopter and allow it to establish decent circles, time five complete cycles.
4) By sighting the helicopter from below attempt to measure and record the radius of movement.
5) Calculate the angle between vertical and the string when the helicopter is running.
6) Draw and label a free-body diagram of the helicopter in operation.
7) Draw a tip-to-tail vector diagram showing Fc as the net force and calculate and record Fc.
8) Use the mass from procedure 2, determine the period of one circle from procedure 3 and the radius from procedure 4 to determine and record the value of Fc.
9) Do a percent difference calculation between your values in procedures 7 and 8.

Part II Horizontal Circles

1) Open the file Horizontal Circles on the network from I:\handout\Sciences\Strachan
2) Complete a table like the one below increasing the car's mass in increments of 10 kg and keeping the velocity constant at 10 m/s:

Mass of Car (kg)	Force of Friction required to turn (Fc) (N)
0	
10	
20	
:	
:	
:	
100	

3) Complete a graph of Fc vs. M on a sheet of graph paper devote at least ¼ page.
4) Complete a table like the following by varying the velocity from 0 to 24 m/s in 3 m/s increments while keeping the mass constant at 50 kg.

velocity of Car (m/s)	Force of Friction required to turn (Fc) (N)
0	
3.0	
6.0	
:	
:	
:	
24.0	

5) Complete a graph of Fc vs. v on a sheet of graph paper devote at least ¼ page.

Part III Vertical Circles

1) Open the file Vertical Circles on the network from I:\handout\Sciences\Strachan
2) Draw and label a free body diagram of the cat at the top of the swing and a second diagram at the bottom of the swing.
3) Using the magnitude of velocity at top and bottom and the information in the simulation determine the tension in the cable at the top and bottom of a revolution.

Discussion:

1) Explain some logical reasons for your percent difference in Part I.
2) State the relationship between Ff and Fc for horizontal circles.
3) Using your graphs make clear statements showing the dependency of Fc on m and v.
4) Explain why the velocity increases from top to bottom of the circle in Part III and state the effect this has on the tension.

No conclusion necessary if your answers to the *Discussion* are decent.