8.4: Procedures

You will analyze three systems involving circular motion.

1. Draw a table in which to record your circular motion data and observations. **Do not fill in data until you have read the instructions for obtaining that data.**

Table 8.4.1: Circular motion data and observations

System	Mass (grams)	Radius of Path (centimeters)	Centripetal Force	Push or Pull	Centripetal Force Direction
Marble & Pie Tin					
Ball & Rope					
Spaceship & Earth					

Marble around the Pie Tin

2. Predict the path the marble will take as it leaves the opening in the pie tin. Will it continue in a circular path or will it travel in a straight line when it leaves the pie tin? Describe or sketch your prediction.
3. Place the pie tin on the table, and start the marble traveling along the inside edge of the pie tin. You will need to give the marble a good, fast start with your hand; the pie tin should remain on the table for this. Describe or sketch the path of the marble after it leaves the pie tin through the opening.

Figure 8.4.1: Path of the marble

4. Name or describe the centripetal force that kept the marble traveling in a circle while it was in the pie tin. Record whether the marble was pushed or pulled into a circular path, and the direction of the push or pull that kept the marble circling while it was in the pie tin.
5. Measure the mass of the marble, and the radius of the pie tin. Enter these values in your data table.

Orbiting Object

Warnings

- Be careful that no one is impacted by your orbiting object, and do not let go of it.
- Impact safety glasses are recommended while circling the object on the rope.

6. Predict whether it will be more difficult to hold onto the rope when the object is circling with a slow or fast speed. Record your prediction.
7. Hold the rope firmly and circle the object at a steady rate. Then increase the speed at which your object is circling. In which case is more force required to hold onto the circling object, when it has a slow orbital speed or a fast orbital speed? Record your answer.

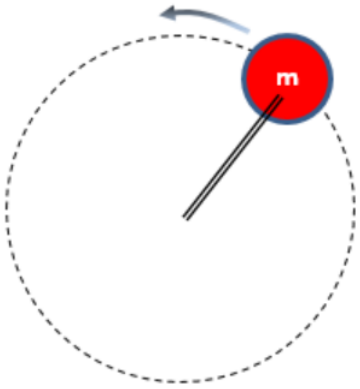

Figure 8.4.2: Circling the object at a steady rate

8. Name or describe the centripetal force that kept the object on the rope traveling in a circle. Record whether the object on the rope was pushed or pulled into a circular path, and the direction of the push or pull that kept the ball and rope circling.
9. Measure mass of the object and rope, and the radius of the system (length of the rope). Enter the mass and radius values in your data table.

Space Ship

10. A spaceship is in orbit 300 km above the surface of the Earth (r = 6.378 x 106 meters). Assume the spaceship is the USS Enterprise from Star Trek, with a mass of 9.6 x 107 kg. Record the mass of the ship and the radius of the orbit in your data table.

Figure 8.4.3: Spaceship Comic-Con 2006 - USS Enterprise by The Conmunity - Pop Culture Geek is licensed under CC BY 2.0

Figure 8.4.4: Earth Blue Marble 2002 by NASA is in the public domain

11. Name or describe centripetal force that keeps the spaceship orbiting the Earth. Record whether the ship is pushed or pulled into a circular path, and the direction of the push or pull that keeps the ship circling.

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