

Inertia & Centripetal Force

Objective: To learn what Newton's first law (inertia) and centripetal force are.

Research:

- Force: a push or pull.
Net force (unbalanced)
that causes motion.
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Research:

- Inertia: force that keeps an object doing what it is currently doing. The object wants to continue the same speed and direction.

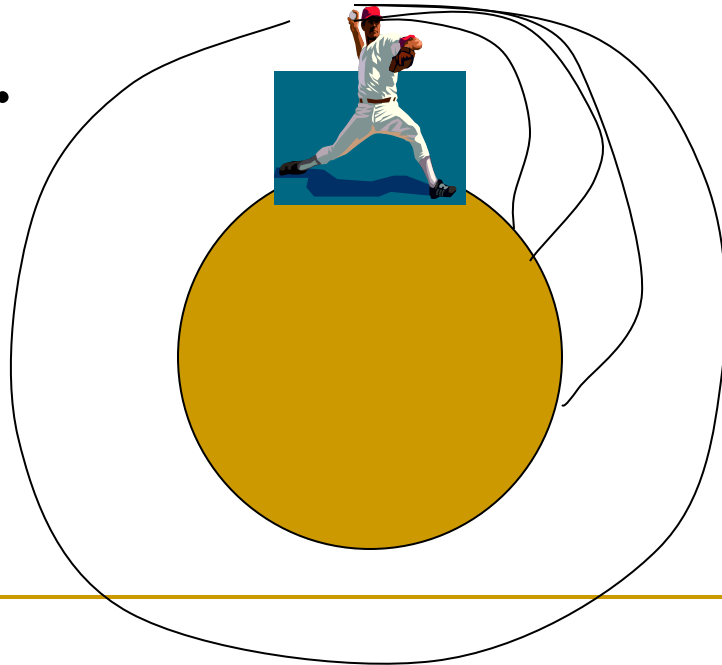
Research:

- *If it is at rest*, it stays at rest. *If it is in motion*, it stays in motion *at the same speed and direction.*
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Research:

- Newton's First Law of Motion:
an object at rest or in motion
remains at rest or in motion
unless acted on by a net force.
(known as law of Inertia)

- Centripetal Force: a force that causes an object to move toward the center of a circle. *Inertia keeps the object moving in a straight line, and some other force acts to pull the object inward.*



9,700 m/s
or
21,698 mi/hr

Demonstration

- Observe the bucket half filled with water. What are the forces acting on the bucket and on the water? Why doesn't the water fall out of the bucket?

Activity - Inertia

- Hold one end of the track to the top of two books with the flat side up. Let the other end rest on the table top.
- Measure the height of the two books.
- Use the small clay ball and gently set it on the hood or roof of your toy car. Do not press it onto the car.
- Place a ruler three *car lengths* from the end of the ramp.

- Release the car from the top of the ramp and allow it to collide with the ruler.
- Measure the distance the clay ball travels from the car.
- Repeat the exercise using four books.

Number of books	Height of ramp	Distance traveled (cm)
2	cm	cm
4	cm	cm

Circular Motion Due to Centripetal Force

- Make observations about the flight of the penny:

What happens when the hanger stops the flight of the penny?

What pushes the penny to keep it moving toward the center of the circle?

CONCLUSIONS

1. Why does an object move only when forces are unbalanced?

Because it takes a net force to cause motion.

2. What does inertia mean?

Force where object keeps doing what it's doing.

3. What is the relationship between the height of the track and the distance traveled by the clay ball?

The higher the track the greater the distance the clay ball was thrown.

CONCLUSIONS

4. What would happen to the distance traveled by the clay ball if it were more massive? Why?

It wouldn't travel as far because it's more massive (2nd law) $F = M \times A$

5. When you are in a car and it comes to a sudden stop, what happens to your body and why?

Body keeps moving forward because of inertia.

CONCLUSIONS

6. What force keeps the penny sitting on the hanger?

Centripetal force.

7. What would happen to the motion of earth if the sun stopped it's pull of gravity?

Fly off into space in a straight line.

Newton's Laws of Motion

First Law: “Law of Inertia” An object at rest stays at rest, an object in motion stays in motion, unless acted on by a net force.

Second Law: The acceleration of an object depends on its mass and the size and direction of the force acting on the object.

Third Law: For every action there is an equal and opposite reaction.

Demonstration I

- Write a hypothesis for the best way to knock the coin out of the circle.
- Watch the attempts to knock the coin out of the circle. List the different attempts made.