# 23.1 Force (Newton's 3 Laws of Motion)

Physical Science

**Summarize main points from each video.**

**Video Title / topic** _____

**Video Title / topic** _____

**Video Title / topic** _____

# Topic Introduction

**Summarize your understanding of each paragraph.**

**Sir Isaac Newton** was an English mathematician, astronomer, theologian and physicist who is widely recognized as one of the most influential scientists of all time. Newton's laws of motion are three physical laws that laid the foundation for classical mechanics.

**First law:** An object at rest remains at rest and an object in motion remains in motion - unless acted upon by a force.

**Second law:** Force equals mass multiplied by acceleration (F= ma).

**Third law:** When one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body.

# Read/Summarize Text

1. **Read the passage.**
2. **Underline key expressions in each sentence.**
3. **Re-write each word (or expression) you underlined.**
4. **Summarize the passage.**

*Oklahoma HS-PS2 1 through 4 (2015). Forces and Interactions*

1

2

Newton's second law accurately predicts changes in the motion of macroscopic objects.

Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.

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Beginning page 140.

*Re-write words you underlined*

3

_____ _____ _____

_____ _____ _____

*Using a complete sentence, summarize or rephrase the passage*

4

# Read Text for Comprehension

Read this article for deeper understanding.  No summary is required, although you may want to circle, underline, or mark key ideas and words.

Newton's Principia formulated the **laws of motion** and **universal gravitation** that dominated scientists' view of the physical universe for the next three centuries. By deriving Kepler's laws of planetary motion from his mathematical description of gravity, and using the same principles to account for the trajectories of comets, the tides, the precession of the equinoxes, and other phenomena, Newton removed the last doubts about the validity of the heliocentric model of the Solar System and demonstrated that the motion of objects on Earth and of celestial bodies could be accounted for by the same principles. Newton's theoretical prediction that the Earth is shaped as an oblate spheroid was later vindicated by the geodetic measurements of Maupertuis, La Condamine, and others, thus convincing most Continental European scientists of the superiority of Newtonian mechanics over the earlier system of Descartes.

Newton also built the first practical **reflecting telescope** and developed a sophisticated **theory of color** based on the observation that a prism decomposes white light into the colors of the visible spectrum. Newton's work on light was collected in his highly influential book Opticks, first published in 1704. He also formulated an empirical **law of cooling**, made the first theoretical calculation of the **speed of sound**, and introduced the notion of a **Newtonian fluid**. In addition to his work on calculus, as a mathematician Newton contributed to the study of **power series**, generalized the **binomial theorem** to non-integer exponents, developed a method for approximating the **roots of a function**, and classified most of the **cubic plane curves**.

**Physics:** *laws of motion; universal gravitation; reflecting telescope, theory of color; law of cooling; speed of sound; Newtonian fluid.*

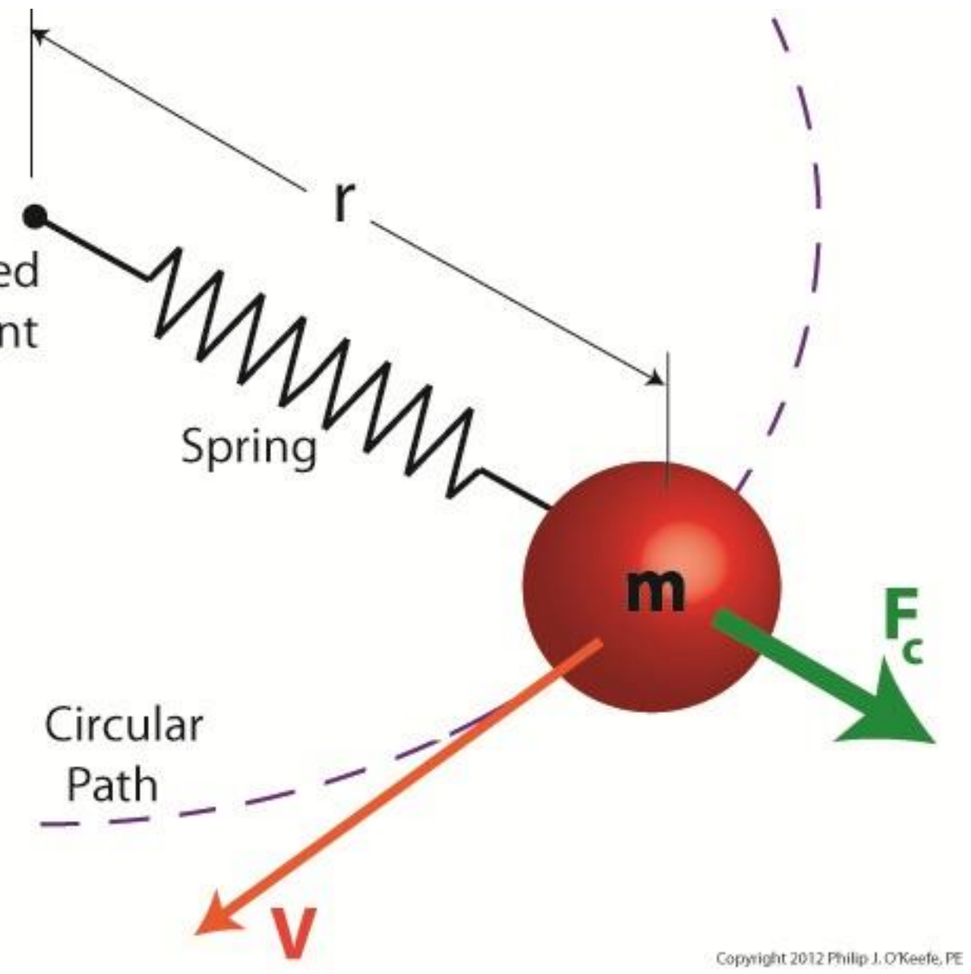
**Math:** *power series; binomial theorem; roots of a function; cubic plane curves.*

https://en.wikipedia.org/wiki/Isaac_Newton

# Draw Illustration

**Copy and Label the Illustration in the Space Provided**

**Illustration**




http://www.engineeringexpert.net/Engineering-Expert-Witness-Blog/tag/sir-isaac-newton

**Draw (Copy) the Illustration Here**

# Interpret a Graph

**Write the title of the graph _____**

**Circle the type of chart this represents**

*Bar Chart* *Line Chart* *Pie Chart* *Other*

**If applicable,**

**What does the X-axis represent _____**

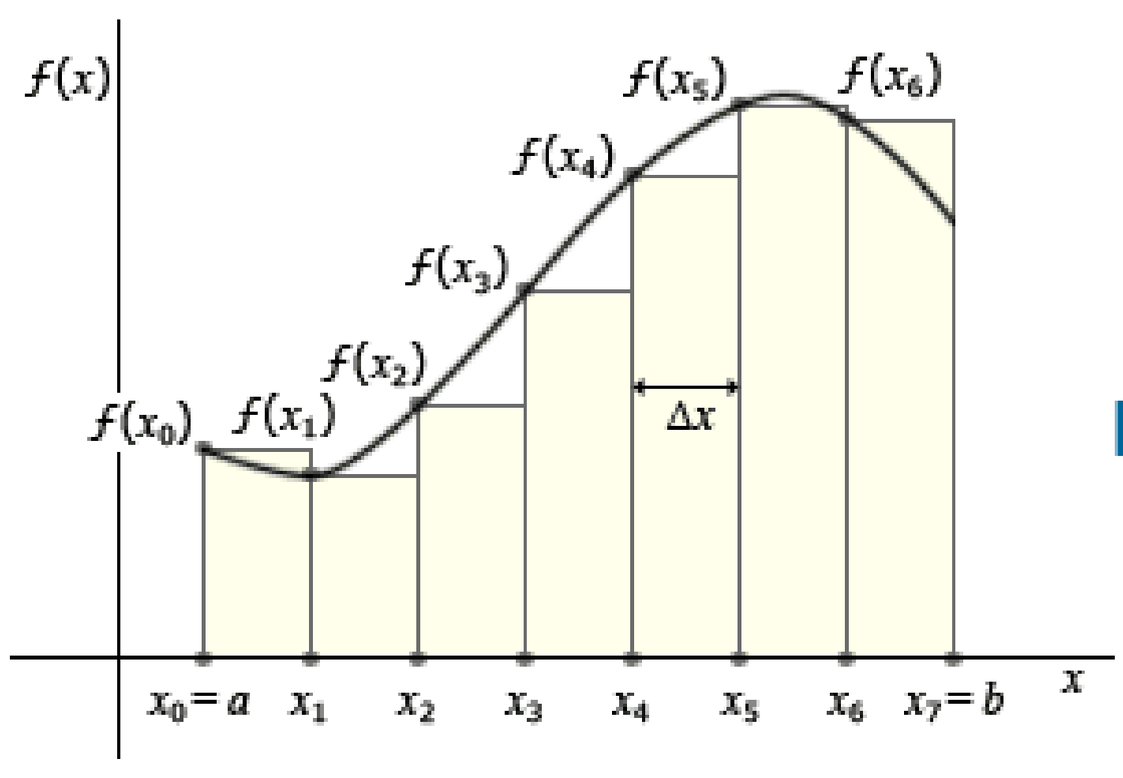
**What does the Y-axis imply _____**

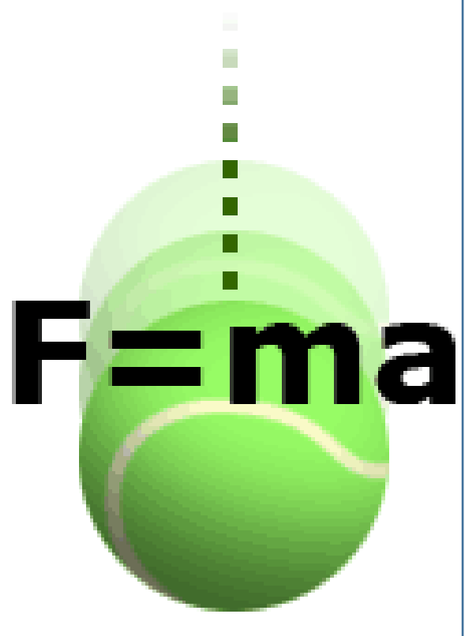
**Summarize what this graph represents or conveys**

_____

https://undsci.berkeley.edu/article/mathematics

Advances in calculus helped Isaac Newton formulate a new understanding of how objects in the natural world move.



# Show-Off Your Smarts!

**Instructions**

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

**Q1. How can this information be applied to a young-person's life?**

**Q2. How does this information apply to (or impact) communities?**

**Q3. When do scientists need to apply this information? How?**

**Q4. How would a person from 100 years ago view this information?**

**Q5. How does this topic connect to other science topics or math?**

*Write down at least three words introduced or covered by this topic.*

1.
2.
3.
4.
5.
6.

# Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.