

# 22.1 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.**

In physics, motion is a change in position of an object over time. Motion is described in terms of displacement, distance, velocity, acceleration, time and speed.

If the position of a body is not changing with respect to a given frame of reference, the body is said to be at rest.

Classical mechanics is fundamentally based on Newton's laws of motion. These laws describe the relationship between the forces acting on a body and the motion of that body. They were first compiled by Sir Isaac Newton .

The three Laws of Motion: (1) Every object will remain at rest unless acted upon by an external force (2) Force equals mass times acceleration (3) For every action in nature there is an equal and opposite reaction.

[https://en.wikipedia.org/wiki/Motion\\_\(physics\)](https://en.wikipedia.org/wiki/Motion_(physics))

# 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.

## *Newton's Laws of Motion*

Newton's three laws of motion were the first to accurately provide a mathematical model for understanding orbiting bodies in outer space. This explanation unified the motion of celestial bodies and motion of objects on earth.

1. A body either is at rest or moves with constant velocity, until and unless an outer force is applied to it.
2. An object will travel in one direction only until an outer force changes its direction.
3. Whenever one body exerts a force  $F$  onto a second body, the second body exerts the force  $-F$  on the first body.  $F$  and  $-F$  are equal in magnitude and opposite in sense. So, the body which exerts  $F$  will go backwards.

<https://www.grc.nasa.gov/www/k-12/airplane/newton.html>

## *Re-write words you underlined*

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

# 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.

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The motion of an aircraft through the air can be explained and described by physical principals discovered over 300 years ago by Sir Isaac Newton. Newton worked in many areas of mathematics and physics. He developed the theories of gravitation in 1666, when he was only 23 years old. Some twenty years later, in 1686, he presented his three laws of motion in the "Principia Mathematica Philosophiae Naturalis."

(1)

Newton's **first law** states that every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force. This is normally taken as the definition of inertia. The key point here is that if there is no net force acting on an object (if all the external forces cancel each other out) then the object will maintain a constant velocity. If that velocity is zero, then the object remains at rest. If an external force is applied, the velocity will change because of the force.

(2)

The **second law** explains how the velocity of an object changes when it is subjected to an external force. The law defines a force to be equal to change in momentum (mass times velocity) per change in time. Newton also developed the calculus of mathematics, and the "changes" expressed in the second law are most accurately defined in differential forms.

$$\mathbf{F} = \mathbf{m} * \mathbf{a}$$

(3)

The **third law** states that for every action (force) in nature there is an equal and opposite reaction. In other words, if object A exerts a force on object B, then object B also exerts an equal force on object A. Notice that the forces are exerted on different objects. The third law can be used to explain the generation of lift by a wing and the production of thrust by a jet engine.

# Draw Illustration



Copy and Label the Illustration in the Space Provided

## Types of Forces

### Contact Forces

Frictional Force

Tension Force

Normal Force

Air Resistance Force

Applied Force

Spring Force

### Action-at-a-Distance Forces

Gravitational Force

Electrical Force

Magnetic Force

<http://www.physicsclassroom.com>

**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,

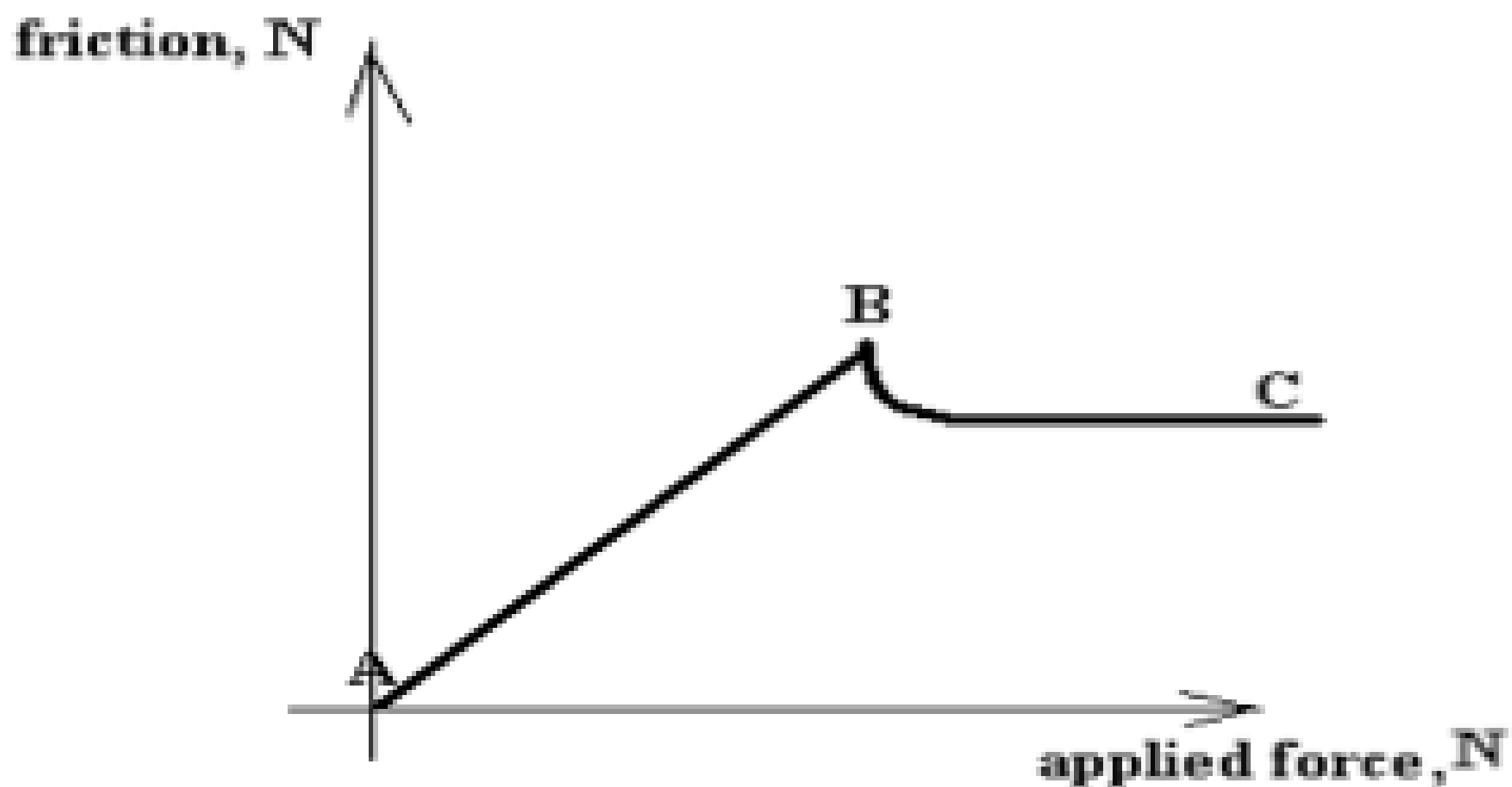
What does the X-axis represent \_\_\_\_\_

What does the Y-axis imply \_\_\_\_\_

Summarize what this graph represents or conveys

\_\_\_\_\_

<http://www.chegg.com>





# 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?**

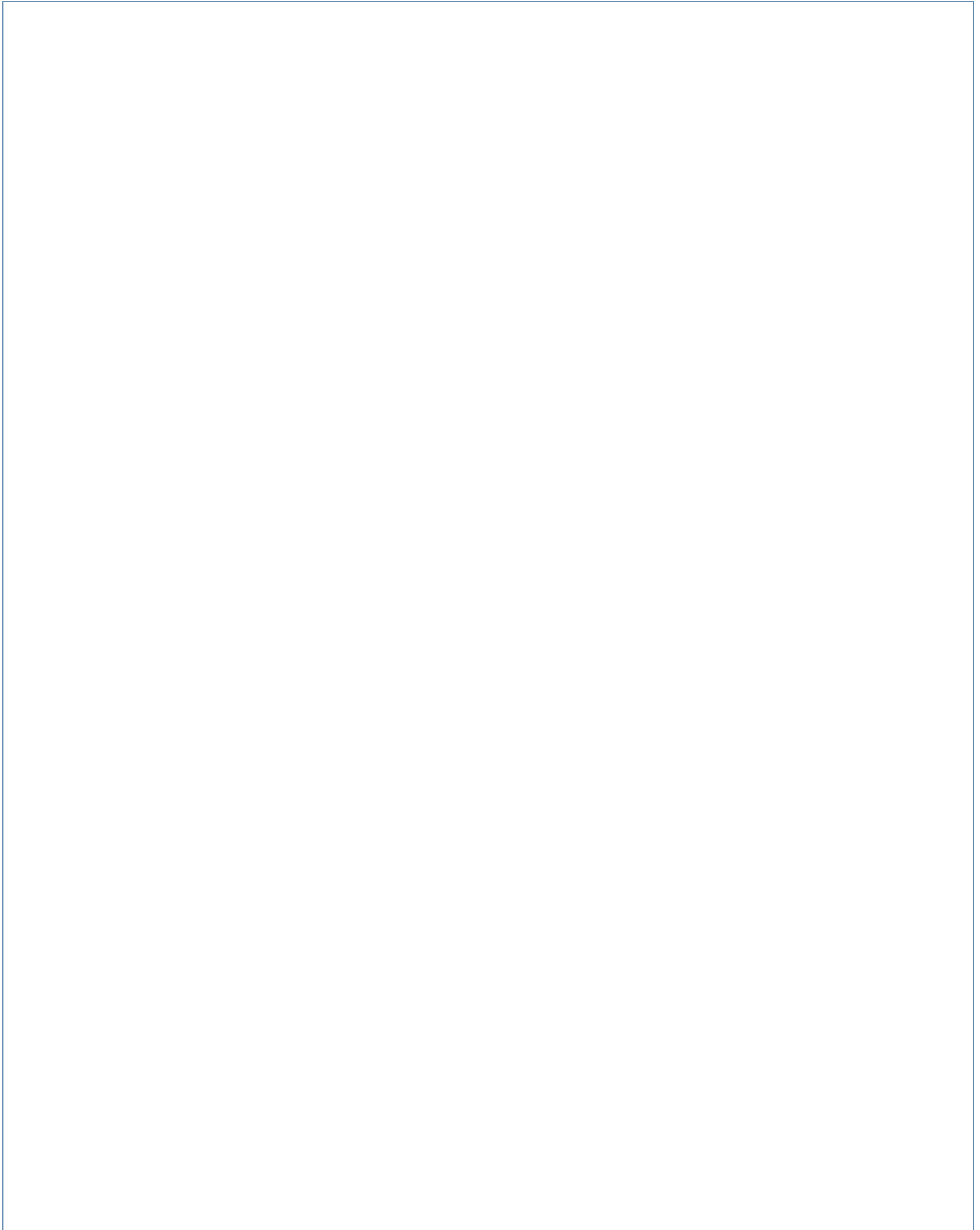
**Q5. How does this topic connect to other science topics or math?**

*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.

A large, empty rectangular box with a thin blue border, intended for students to create a poster. The box occupies the majority of the page below the instructions.