



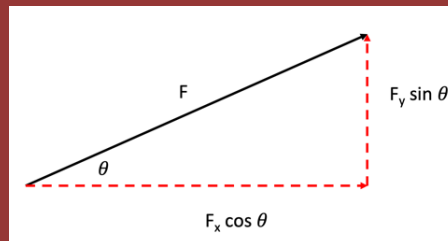
Forces

5E Lesson



The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions



Forces 5E Lesson

Grades 10-12	Forces	Ongoing Learning
Lesson Objective: Students will learn about the following: - Force Overview - What is a Force? - The Four Fundamental Forces - Forces all around us - Normal, Friction and Tension force - Other common forces - Contact vs. Action at a distance force - Measuring force - System and Free-Body Diagrams - Finding Fnet - Force vectors and analyzing forces		
Possible Student Misconceptions: - A force always makes things move - Gravity is a very strong force - There aren't forces all around us - Things need to be touching to be considered a force		
Materials: 1 device (smartphone, Chromebook, laptop, tablet, or computer) per 3 students - A means of projecting a presentation - Internet access - General classroom objects		
Teacher Notes: - The presentations as well as the student notes are in Google and Office format and can easily be used in class or online - All videos can be accessed directly from the presentation. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If it does not, right-click on the image and click Edit Hyperlink or something similar - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ - I don't believe in long lessons. If you feel your students are losing their focus, stop the presentation and give them a 5-minute break. If you'd like to show a video, I recommend my video collection here - http://www.teachwithfergy.com/science are tons of brain-break videos to choose from all grouped by category.		

Forces - 5E Lesson

Engagement Phase Your students will complete the reading ' <i>The Effects of Everyday Forces</i> ' and answer the associated questions. Teacher Notes: The reading contains 'Extension Questions' which you can assign at your discretion. Sometimes they work well for students who finish early or if you'd like your students to spend more time getting introduced to the subject.	Duration: 50 minutes Teacher Role – Facilitate learning and guide student understanding Goals ☐ Connect student's experiences ☐ Create interest ☐ Ask questions ☐ Understand the objectives of the lesson
Exploration Phase Exploration – Lab Station Activity - In groups of 2-3, have your students complete <i>Exploration – Forces Lab Station Activity</i>. Once they're done, they will submit their passport to you. Teacher Notes: - The complete instructions for my Lab Station are found in the <i>START HERE – Instructions</i>	Duration: 1 hour Teacher Role – Facilitate learning and guide student understanding Goals ☐ Students receive real experience with the topic

Elaborate Phase

Elaborate

Your students will complete – *Elaborate – Forces*. This activity will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding of forces in everyday life.

Teacher Notes:

- Students will work individually or in small groups
- Students will need one device per group

Evaluate Phase

Quiz

Have your students complete - *Evaluate – Forces Quiz*

Duration: 1 hour

Teacher Role – Facilitate learning and keep students focused

Goal

- ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations

Duration: 50 min

Teacher Role – Distribute and collect evaluation

Goal

- ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress

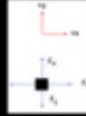
Each phase is clearly described

Two Complete Lessons

TWF

Force Introduction

- What is a Force?
- The Four Fundamentals Forces
 - Gravitational, Strong Nuclear, Electromagnetic, Weak Nuclear
- Force of Gravity
- Everyday Forces
 - Normal Force, Friction, Tension
- Action at a Distance Forces
- Measuring Force
- Free Body Diagrams
- Net Force
- Force Vectors
- Finding F_{net}






Forces and Free-Body Diagrams

- Forces Review
- Common Forces
- Free-Body Diagrams
- Analyzing Forces
- Force Vectors
- Choosing a coordinate system
- Practice





TWF

Check Your Understanding

In hitting a volleyball, a player applies an average force of 9.9 N [33° above the horizontal] for 5.0 ms. The force of gravity on the ball is 2.6 N [down]. Determine the net force on the ball as it is being struck.

Check Your Understanding

In hitting a volleyball, a player applies an average force of 9.9 N [33° above the horizontal] for 5.0 ms. The force of gravity on the ball is 2.6 N [down]. Determine the net force on the ball as it is being struck.

Answer: 8.8 N [19° above the horizontal]

Opportunities for students to check their understanding with answer key

Tension (F_T)

- The rope held between two teams in a tug of war is under tension
- Muscle fibres of our body experience tension when they contract




Tension (F_T)

- Tension Force is a force exerted by string, ropes, fibres, and cables
- The rope held between two teams in a tug of war is under tension
- Muscle fibres of our body experience tension when they contract




Student and Teacher versions of the presentations

Check Your Understanding

State an everyday life example in which a force causes an object to

- decrease its speed.
- become compressed.
- become stretched.




Check Your Understanding

A weightlifter holds a weight above his head by exerting a force of 1800 N [up]. The force of gravity acting on the weight is 1600 N [down].

- Draw a FBD of the weight
- State the net force at that instant.

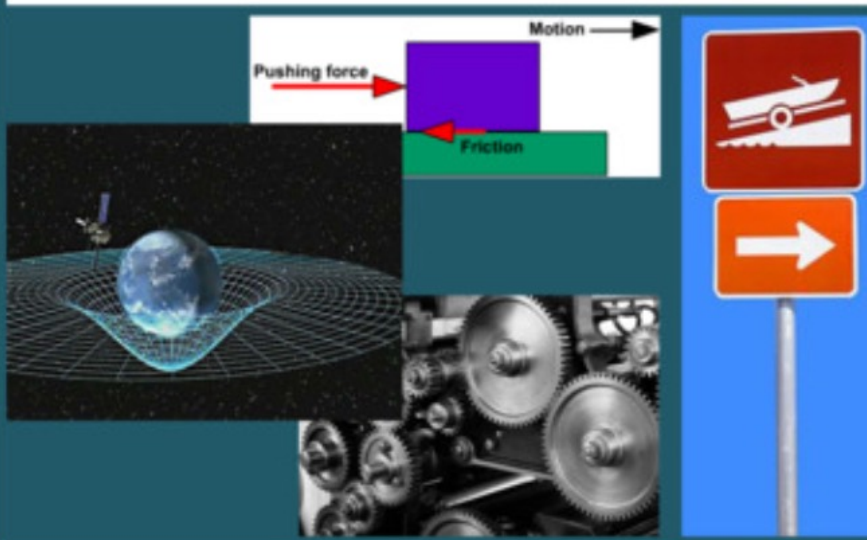
Opportunities for students to check their understanding

Interactive and Engaging Activities

TWF

Forces

Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

The Effects of Everyday Forces

Scientific Reading Comprehension Article and Extension Activity



Improve your students' **Literacy** and **Analysis Skills**, use as an **Emergency Substitute Plan**, or create **Applicability** in your classroom

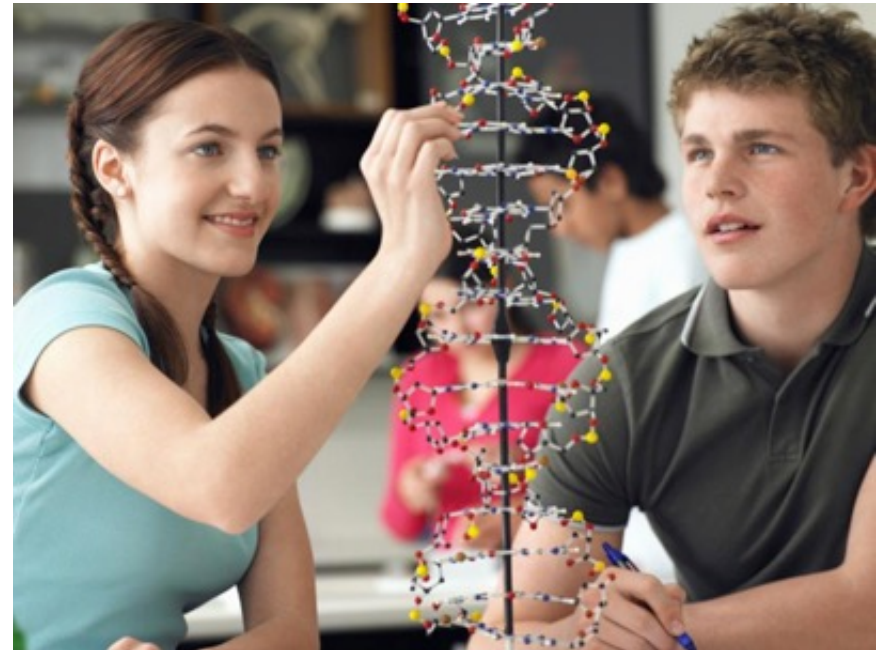
Get away from tired practices and unengaged students



TWF

Provide a Scientifically-Proven means of instruction

TWF



Incorporate Technology and Increase Collaboration



TWF

