Lesson Plan for ... (STEM Asyut)

Date & Time Created:	Click or tap to enter a date.		
Date & Time Modified:	Click or tap to enter a date.		
Subject	Mathematicise G12		Semester 1
Grade	12		Choose an item.
Teacher:	Sahar shaban	**School :**	STEM Assuit
Learning Outcome			
LO Code	MA.2.08	**LO text**	Friction is a force that resists the relative motion or tendency of such motion of two surfaces in contact. It is a ubiquitous phenomenon present in everyday life, influencing the movement of objects around us**.**

Concepts	**Skills**
• 1. Friction. • 2. Smooth surface. • 3. Rough surface. • 4. Static Friction. • 5. Kinetic Friction. • 6. Reaction force. • 7. Kinetic friction force. • 8. Angel of friction. • 9. Gripping	a. Ability for practical application: apply friction concepts to real-life situations and understand how friction affects the behavior of different objects and systems. b. Measurement and experimental skills: use appropriate tools to measure forces and variables related to friction, such as a spring ligament to measure forces and a plane to measure angles and distances. c. Analysis and critical thinking skill: analyze the data and results he collects during experiments, and think critically about the causes and factors that affect friction. d. Communication Skills: able to communicate clearly and effectively about friction concepts and findings, whether through group discussions or presentations. e. Problem-Solving Skills: Responses to problem-solving tasks or scenarios that require students to apply their understanding of friction to find solutions.

Duration of Learning Outcome
MA.2.08(Week 01 - Week 03)
Evidence of Learning Outcome

- Determine the difference between kinetic friction and static friction

Answer the exercises in the lesson, starting from easiest to most difficult

Interact with and participate in existing activities

Capstone Connection	
MA.2.08: Connecting real-life applications of friction to the capstone project	

Textbook & Resource Material	
Contemporary book on statics YouTube Research gate	

Essential Question/s
What is friction and how to find the resultant force acting on a body in states of rest and motion?

Lesson Number in LO Sequence
1

Objective/s for Lesson
By the end of this session students should be able to: 1- The student learns about the concept of friction, its types, factors affecting it, and its practical applications. 2- Introducing students to the concept of friction and its importance in daily life. 3- -Explain the factors affecting friction. 4- Learn about the different types of friction and their practical applications.

Evidence of Achievement of Lesson

Instructional Activity #(1)	
Purpose of Activity	students engagement
Estimated Time:	5 min
Organization of Students - Student will work in:	Individually or groups
Teaching Strategy	Observation and experimentation
Specific concept and/or skill addressed	Friction Testing
Description of Activity	Provide students with different surfaces (e.g., sandpaper, cardboard, smooth wood, aluminum foil). Have them attach a small weight or object to a block and measure the force required to slide the block across each surface using a spring scale. Students can record their observations and compare the frictional forces on different surfaces.

Connections to Capstone, Grand Challenge, other subjects	Related to equilibrium
Formative Assessment During Learning:	Students participate in the discussion and answer the question
Instructional Activity #(2)	
Purpose of Activity	1. Discovery of the Law of the Coefficient of Friction 2. Calculation of the coefficient of friction by law
Estimated Time:	10 min
Organization of Students - Student will work in:	Groups of 5
Teaching Strategy	Exploration and conclusion
Specific concept and/or skill addressed	Coefficient of Friction
Description of Activity	Introduce the concept of coefficient of friction (μ) as a measure of the friction between two surfaces. Ask students to calculate the coefficient of friction between various pairs of materials using the formula: Coefficient of Friction = Frictional Force / Normal Force. Provide different materials and surfaces for experimentation, and have students measure the forces involved to calculate the coefficients.
Connections to Capstone, Grand Challenge, other subjects	Related to equilibrium
Formative Assessment During Learning:	Students answers in a worksheet
Instructional Activity #(3)	
Purpose of Activity	understand the relationship between surface roughness and friction.
Estimated Time:	5 min
Organization of Students - Student will work in:	individually or in groups
Teaching Strategy	Discussion and Exploration
Specific concept and/or skill addressed	Surface Roughness Exploration
Description of Activity	Provide students with objects of varying surface roughness (e.g., sandpaper of different grits, smooth plastic, rough fabric). Ask them to predict and test how the roughness of surfaces affects friction. Students can measure the force required to move objects across each surface and analyze their findings to understand the relationship between surface roughness and friction.

Connections to Capstone, Grand Challenge, other subjects	Related to equilibrium
Formative Assessment During Learning:	Students answers through discussion.
Evaluation of Evidence:	
If the student miss any part in learning activity (1&3) he/she is not proficient yet(yellow) If the student answer all questions in learning activity (1&2) he/she is proficient (green) If the student answer all questions in learning activity (1)&(2) &(3)he/she is high proficient (blue)	
Homework:	
Assign students to write a short paragraph describing a real-life scenario where friction plays a crucial role, explaining the type of friction involved and its significance	
Teacher Notes and Reflections:	
Evidence of learning is worksheets in learning activity 2&3.	

Traditional lesson plan

Grade Level: **Third secondary** **Class time:** **45 minutes**

Objective

- Students will understand the concept of friction and its significance in everyday life.
- Students will be able to identify different types of friction and explain their characteristics.
- Students will explore practical applications of friction in various contexts.

Materials Needed

- Whiteboard and markers
- Visual aids (diagrams, pictures, or videos showing examples of friction)
- Various objects with different textures (e.g., sandpaper, cardboard, fabric)
- Inclined plane or ramp
- Objects of different weights
- Spring scales or force meters
- Stopwatch (optional)

Introduction (10 minutes)

- Begin by asking students if they have ever experienced situations where objects were hard to move or easy to move across different surfaces.
- Introduce the concept of friction as the force that opposes motion between two surfaces in contact.
- Use visual aids or real-life examples to illustrate the effects of friction, such as rubbing hands together, sliding objects on different surfaces, or walking on slippery floors.

Types of Friction (15 minutes)

- Explain the different types of friction: static friction, kinetic friction, rolling friction, and fluid friction.
- Discuss the characteristics of each type of friction and provide examples for clarity.
- Engage students in a brief discussion about where each type of friction might occur in everyday life.

Factors Affecting Friction (10 minutes)

- Discuss the factors that affect the amount of friction between two surfaces, such as surface roughness, weight of the objects, and the force pressing the surfaces together.
- Use the inclined plane or ramp to demonstrate how the angle of inclination affects the frictional force required to move objects

Conclusion (5 minutes)

- Summarize the key points of the lesson, emphasizing the importance of friction in our daily lives and various applications.
- Review the different types of friction and the factors affecting frictional force.
- Encourage students to think about how they can apply their understanding of friction to solve real-world problems or improve existing technologies.

Assessment

- Informal assessment through class participation and group discussions.
- Observation of students' engagement and understanding during practical activities.
- Exit ticket or short quiz to assess students' comprehension of friction concepts.

Homework

- Assign students to write a short paragraph describing a real-life scenario where friction plays a crucial role, explaining the type of friction involved and its significance.

CEP Lesson Plan Form

Teacher: Carol-Anne Lucero Date: 10/3/17

School: Rocky Mountain High School Grade Level: 10-12 Content Area: AP Physics

Title: Falling and Friction – How Do the Two Coexist? Lesson #: 1 of 1

Lesson Idea/Topic and Rational/Relevance: What are you going to teach and why is this lesson of importance to your students? How is it relevant to students of this age and background? Why are you teaching this lesson now (what came before/what will come after)? What teaching methods/strategies will you use and why?	I'm teaching about friction along a ramp. Of course, since this is an AP physics class, many students will have to know this for an AP test, but this subject in particular is really cool because it has a ton of practical applications that I hope my practice problems model. Are you going to slip down your icy driveway because the angle is too steep? Can a train make it up a hill if the rails are slick from the rain? You're skiing, and the coefficient of static friction is pretty small, how fast can you get going down a hill that has an incline of 10 degrees? This lesson comes after some pretty basic friction problems and before we introduce another force. It also goes great because I talked about forces on an angled plane earlier and now I get to revisit it with friction! I plan to use tons of questioning in my lesson mostly to check for understanding but to challenge students who might find it easy or to scaffold those who are unsure.

Content Standard(s) addressed by this lesson: *(Write Content Standards directly from the standard)*

Science 1.1 - Newton's laws of motion and gravitation describe the relationship among forces acting on and between objects, their masses and changes in their motion – but have limitations.

Understandings: *(Big Ideas)*

Friction - Newton's 2nd law: Fnet = ma - Breaking vectors into components using sine and cosine

Recall kinematics equations

Inquiry Questions: *(Essential questions relating knowledge at end of the unit of instruction)*

What makes objects move (or not move) in the way that they do?

Evidence Outcomes: *(Learning Targets) AND (Success Criteria)*

I can: Apply Newton's 2nd Law to friction along ramps scenarios.

This means: All students will be able to draw a free body diagram that correctly identifies all forces (shown as vectors), their direction and and calculate the magnitude of each force for 100% of the steps of the scenario.

List of Assessments: *(Note whether the assessment is formative or summative)*

All summative: Oral questioning and follow up probes, visual representation (free body diagram), hand signals