Zee High School
Shaping the Future Today
Hayathnagar Campus

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PROJECT ASSIGNMENT

Force, Displacement, Time - Class Project

Class: Class 11 | Subject: Physics

Topic: Force, Displacement, Time

Learning Objectives

- Define force, displacement, and time, and explain their interrelationships through fundamental kinematic equations (Understand).
- Apply the concepts of force, displacement, and time to solve problems involving uniform and non-uniform motion, including calculating displacement, velocity, and acceleration (Apply).
- Analyze the effect of variable forces on the motion of an object, utilizing graphical methods (e.g., force-time graphs) to determine impulse and change in momentum (Analyze).
- Differentiate between average and instantaneous velocity and acceleration, and apply calculus to relate displacement, velocity, and acceleration as functions of time (Apply/Analyze).
- Interpret real-world scenarios involving projectile motion and uniform circular motion using the principles of force, displacement, and time, quantitatively predicting trajectories and related parameters (Analyze).

Total Students: 5

Each student has been assigned a unique project format to demonstrate their understanding.

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Demo Student

HANDS-ON

Class 11 • Physics

Forces in Motion: A Class 5 Teach-Back

Topic: Force, Displacement, Time

Demo Student will design a 15-minute lesson plan to teach the concepts of force, displacement, and time to Class 5 students.

Instructions

1. Step 1: Brainstorm real-world examples of force, displacement, and time that Class 5 students can relate to (e.g., pushing a toy car, a ball rolling, timing a race).
2. Step 2: Develop a catchy hook to grab their attention at the beginning of the lesson (e.g., a short demonstration, a question).
3. Step 3: Create a simple explanation of force, displacement, and time using age-appropriate language and visuals (e.g., diagrams, pictures).
4. Step 4: Design a hands-on activity that allows students to explore these concepts (e.g., measuring the distance a toy car travels when pushed with different forces, timing how long it takes to walk a certain distance).
5. Step 5: Prepare clear instructions and safety guidelines for the activity.
6. Step 6: Devise a quick assessment (e.g., short quiz, drawing, explanation) to check their understanding.
7. Step 7: Write a conclusion that summarizes the key takeaways and reinforces the connection between force, displacement, and time.
8. Step 8: Compile everything into a 15-minute lesson plan including time breakdowns for each section.

What to Submit

- 15-minute Lesson Plan
- Activity Worksheet (if applicable)

Resources Needed

- Textbook (for reference)
- Online resources on teaching science to elementary students
- Basic materials for the activity (e.g., toy cars, rulers, timers)

Estimated Time: 165 minutes

Grading Rubric

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Content Accuracy	All concepts are explained accurately and in age-appropriate	Concepts are mostly explained accurately, with minor	Concepts are explained with some inaccuracies or oversimplifications.	Significant inaccuracies or misunderstandings are present. Lacks a	**30%**

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
	language. Demonstrates a strong understanding of the physics principles.	simplifications. Shows a good understanding of the principles.	Demonstrates a basic understanding.	clear understanding of the concepts.	
Clarity and Engagement	Lesson plan is exceptionally clear, engaging, and age-appropriate. The activity is well-designed and fun.	Lesson plan is clear and engaging. The activity is appropriate and well-structured.	Lesson plan is somewhat clear, but may lack engagement. The activity is adequate but could be improved.	Lesson plan is unclear and unengaging. The activity is poorly designed or inappropriate.	**25%**
Practicality and Feasibility	Lesson plan is highly practical and easily implementable in a Class 5 classroom with minimal resources.	Lesson plan is practical and can be implemented in a classroom with readily available resources.	Lesson plan is somewhat practical, but may require some modifications or additional resources.	Lesson plan is impractical or requires resources that are unlikely to be available in a typical classroom.	**20%**
Assessment Quality	Assessment effectively measures the students' understanding of force, displacement, and time. Demonstrates a clear link to the learning objectives.	Assessment measures the students' understanding of the key concepts. Shows a good link to the objectives.	Assessment attempts to measure understanding, but may not be fully effective or aligned with the objectives.	Assessment is ineffective or missing. Fails to measure understanding of the concepts.	**25%**

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Demo Student 2

WRITTEN

Class 11 • Physics

Newton's Laws Hit the Headlines: 1850 Edition!

Topic: Force, Displacement, Time

Demo Student 2 will write a newspaper article published in 1850 reporting on the growing understanding of force, displacement, and time.

Instructions

1. Step 1: Research the historical context of physics in the mid-19th century, focusing on the development of classical mechanics and the understanding of force, displacement, and time.
2. Step 2: Choose a specific event or discovery related to these concepts that would be newsworthy in 1850 (e.g., advancements in understanding projectile motion, improved clockmaking, applications of steam power).
3. Step 3: Write a compelling headline that captures the essence of the story and grabs the reader's attention.
4. Step 4: Craft a lead paragraph that summarizes the key information and introduces the topic to the reader.
5. Step 5: Develop the body of the article with details, explanations, and quotes (real or imagined) from relevant scientists or figures of the time, using language appropriate for the 1850s.
6. Step 6: Describe how the concepts of force, displacement, and time are involved in the chosen event or discovery.
7. Step 7: Consider including a simple diagram or illustration to visually represent the concepts.
8. Step 8: Proofread the article carefully for accuracy, clarity, and historical consistency.

What to Submit

- Newspaper Article (500-700 words)
- List of Sources (real or imagined)

Resources Needed

- Online historical archives
- Books on the history of physics
- Examples of 19th-century newspaper articles

Estimated Time: 180 minutes

Grading Rubric

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Content Accuracy	Accurately reflects the scientific knowledge of the 1850s regarding force, displacement, and time. Avoids anachronisms.	Mostly accurate in its portrayal of scientific understanding, with minor inconsistencies or simplifications.	Contains some inaccuracies or oversimplifications of the science of the time. May show limited historical understanding.	Significant inaccuracies or anachronisms are present. Demonstrates a poor understanding of the historical context.	**30%**

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Historical Authenticity	Article is written in a style and tone appropriate for an 1850s newspaper. Includes realistic details and quotes.	Article demonstrates a good understanding of the historical context, with minor inconsistencies in style or tone.	Article attempts to capture the historical period, but may lack authenticity in language or details.	Article fails to capture the historical context and appears anachronistic in style and content.	**25%**
Clarity and Engagement	Article is well-written, engaging, and easy to understand for a reader of the time. Effectively explains the scientific concepts.	Article is clear and informative, with a good level of engagement. Explains the concepts adequately.	Article is somewhat difficult to understand or lacks engagement. The explanation of concepts is basic.	Article is unclear, confusing, and unengaging. Fails to effectively explain the scientific concepts.	**20%**
Creativity and Originality	Article demonstrates a high level of creativity and originality in its presentation of the topic. Unique and insightful.	Article is creative and well-developed, with a good level of originality.	Article is adequate but lacks creativity or originality. Follows a predictable format.	Article is uninspired and lacks any originality. Simply rehashes existing information.	**25%**

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Demo Student 3

VISUAL

Class 11 • Physics

The Force-Displacement-Time Web: A Concept Map

Topic: Force, Displacement, Time

Demo Student 3 will create a detailed concept map illustrating the relationships between force, displacement, and time, including kinematic equations and real-world applications.

Instructions

1. Step 1: Place "Force, Displacement, and Time" at the center of your concept map.
2. Step 2: Create five main branches extending from the central concept: (1) Definitions & Units, (2) Kinematic Equations, (3) Types of Motion (Uniform & Non-Uniform), (4) Variable Forces & Impulse, (5) Real-World Applications.
3. Step 3: Under "Definitions & Units," define each term (force, displacement, time) clearly and state their respective SI units.
4. Step 4: Under "Kinematic Equations," list at least three fundamental kinematic equations that relate force, displacement, and time, and explain what each variable represents.
5. Step 5: Under "Types of Motion," differentiate between uniform and non-uniform motion, giving examples for each and explaining how force affects each type of motion.
6. Step 6: Under "Variable Forces & Impulse," explain the concept of impulse and its relationship to change in momentum, and how force-time graphs can be used to determine these quantities.
7. Step 7: Under "Real-World Applications," provide examples of how these concepts apply to projectile motion and uniform circular motion, explaining how force, displacement, and time interact in these scenarios.
8. Step 8: Use arrows and linking phrases to clearly show the relationships between different concepts and branches.

What to Submit

- Completed Concept Map
- Brief explanation of the Map (100-200 words)

Resources Needed

- Physics textbook
- Online resources on kinematics and dynamics
- Concept mapping software (optional)

Estimated Time: 150 minutes

Grading Rubric

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Content Accuracy	All concepts and relationships are accurate and well-defined. Demonstrates a	Most concepts are accurate, with minor errors or omissions. Shows a good	Some concepts are inaccurate or poorly defined. Demonstrates a basic understanding.	Significant inaccuracies and misunderstandings are present. Lacks a clear understanding.	**30%**

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
	deep understanding of the topic.	understanding.			
Organization and Clarity	Concept map is exceptionally well-organized, clear, and easy to follow. Relationships are clearly indicated.	Concept map is well-organized and mostly clear. Relationships are generally well-defined.	Concept map is somewhat disorganized or unclear. Relationships may be difficult to understand.	Concept map is disorganized, confusing, and difficult to follow. Relationships are poorly defined.	**25%**
Depth and Breadth	Concept map covers a wide range of concepts and relationships with significant depth. Demonstrates a comprehensive understanding.	Concept map covers a good range of concepts with adequate depth. Shows a solid understanding.	Concept map covers a limited range of concepts with minimal depth. Demonstrates a basic understanding.	Concept map is superficial and lacks depth. Shows a poor understanding of the topic.	**20%**
Visual Appeal	Concept map is visually appealing and effectively uses colors, shapes, and layout to enhance understanding.	Concept map is visually presentable and easy on the eyes. Uses visual elements effectively.	Concept map is adequate in terms of visual appeal, but could be improved.	Concept map is visually unappealing and difficult to read. Poor use of visual elements.	**25%**

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Demo Student 4

CREATIVE

Class 11 • Physics

Physics in Motion: A Podcast on Force, Displacement, and Time

Topic: Force, Displacement, Time

Demo Student 4 will write a script for a 5-minute podcast episode explaining the concepts of force, displacement, and time to a general audience.

Instructions

1. Step 1: Start with a catchy intro hook to grab the listener's attention (e.g., a relatable anecdote, a surprising fact).
2. Step 2: In the first segment, define force, displacement, and time in simple, everyday language that a general audience can understand.
3. Step 3: In the second segment, explain how these three concepts are related to each other through motion. Use examples such as driving a car or throwing a ball. Explain the concepts of velocity and acceleration.
4. Step 4: In the third segment, discuss a real-world application of these concepts, such as how engineers use them to design roller coasters or how athletes use them to improve their performance.
5. Step 5: Include sound effects or music to enhance the listening experience.
6. Step 6: Write a clear and concise script that flows smoothly and is easy to follow.
7. Step 7: Ensure the script covers all learning objectives related to force, displacement, and time.
8. Step 8: End with an engaging outro that summarizes the key takeaways and leaves the listener with something to think about.

What to Submit

- Podcast Script (5 minutes)
- List of Sound Effects/Music (if used)

Resources Needed

- Physics textbook
- Online resources on kinematics and dynamics
- Podcast examples

Estimated Time: 170 minutes

Grading Rubric

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Content Accuracy	All concepts are explained accurately and in a way that is accessible to a general	Concepts are mostly accurate, with minor simplifications. Shows a good understanding of	Concepts are explained with some inaccuracies or oversimplifications. Demonstrates a basic	Significant inaccuracies or misunderstandings are present. Lacks a clear understanding of	**30%**

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
	audience. Demonstrates a strong understanding.	the principles.	understanding.	the concepts.	
Clarity and Engagement	Script is exceptionally clear, engaging, and easy to follow. The language is appropriate for a general audience.	Script is clear and engaging. The language is appropriate and well-structured.	Script is somewhat clear, but may lack engagement. The language is adequate but could be improved.	Script is unclear and unengaging. The language is poorly chosen or inappropriate.	**25%**
Creativity and Sound Design	Script demonstrates a high level of creativity and effectively uses sound effects/music to enhance the listening experience.	Script is creative and well-developed, with a good use of sound design.	Script is adequate but lacks creativity or originality. Minimal use of sound design.	Script is uninspired and lacks any originality. No use of sound design.	**20%**
Overall Impact	Podcast script is highly informative, engaging, and leaves a lasting impression on the listener. Effectively communicates the importance of force, displacement, and time.	Podcast script is informative and engaging. Effectively communicates the key concepts.	Podcast script is adequate but lacks impact. The message is not clearly conveyed.	Podcast script is ineffective and fails to engage the listener. The message is unclear or confusing.	**25%**

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Demo Student 5

ANALYTICAL

Class 11 • Physics

The Physics of a Baseball Swing: A SWOT Analysis

Topic: Force, Displacement, Time

Demo Student 5 will conduct a SWOT analysis of a baseball swing, focusing on the forces, displacements, and time involved.

Instructions

1. Step 1: Clearly define the "subject" of the SWOT analysis: the physics of a baseball swing.
2. Step 2: Identify the STRENGTHS of a well-executed baseball swing from a physics perspective. This could include efficient transfer of energy, optimal angle of launch, etc. Explain how force, displacement, and time contribute to these strengths.
3. Step 3: Identify the WEAKNESSES of a poorly executed baseball swing from a physics perspective. This might include energy loss, incorrect bat angle, etc. Explain how force, displacement, and time contribute to these weaknesses.
4. Step 4: Identify OPPORTUNITIES for improving a baseball swing based on physics principles. This could include new training techniques, equipment innovations, etc. Explain how these opportunities leverage force, displacement, and time.
5. Step 5: Identify THREATS to a successful baseball swing from a physics perspective. This could include air resistance, gravity, limitations of human strength, etc. Explain how these threats affect the force, displacement, and time of the swing.
6. Step 6: Organize your findings into a standard SWOT matrix (Strengths, Weaknesses, Opportunities, Threats).
7. Step 7: Provide a brief conclusion summarizing the key insights from the SWOT analysis.
8. Step 8: Ensure that all points are explained in terms of force, displacement and time.

What to Submit

- SWOT Analysis Matrix
- Brief Conclusion (100-200 words)

Resources Needed

- Physics textbook
- Online resources on the physics of baseball
- Examples of SWOT analyses

Estimated Time: 160 minutes

Grading Rubric

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
Content Accuracy	Accurately identifies strengths, weaknesses, opportunities, and threats related to the	Mostly accurate, with minor errors or omissions. Shows a good understanding of the	Contains some inaccuracies or oversimplifications. Demonstrates a basic	Significant inaccuracies and misunderstandings are present. Lacks a clear understanding of	**30%**

Criterion	4 - Excellent	3 - Good	2 - Satisfactory	1 - Needs Work	Wt%
	physics of a baseball swing. Demonstrates a deep understanding.	physics principles.	understanding.	the concepts.	
Analytical Depth	Provides a thorough and insightful analysis of each SWOT element, going beyond superficial observations.	Provides a good analysis of each SWOT element, with some depth and insight.	Provides a basic analysis of each SWOT element, with limited depth.	Provides a superficial and incomplete analysis of the SWOT elements.	**25%**
Relevance and Focus	Analysis is highly relevant to the physics of a baseball swing and consistently focuses on force, displacement, and time.	Analysis is mostly relevant and generally focuses on the key concepts.	Analysis is somewhat relevant, but may stray from the core physics concepts.	Analysis is largely irrelevant and fails to focus on force, displacement, and time.	**20%**
Clarity and Presentation	SWOT matrix is well-organized, clear, and easy to understand. Conclusion is concise and insightful.	SWOT matrix is organized and mostly clear. Conclusion is adequate.	SWOT matrix is somewhat disorganized or unclear. Conclusion is basic.	SWOT matrix is disorganized, confusing, and difficult to follow. Conclusion is missing or inadequate.	**25%**