

Name: _____

Block: _____

Date: _____

Engineering Stress Analysis Module Report

Introduction:

In the Engineering & Stress Analysis module, students observe how severe weather, excessive weight, and other forces affect the integrity of structures, such as bridges and buildings. Students apply scientific principles that establish strength and endurance in construction projects, and explore educational and career opportunities in engineering and construction.

Module Details:

Students begin by learning the types of structures and their components, and the forces that act upon them. They also study the principles of size, shape, strength, and deflection of construction beams under load. For one of the hands-on experiences, students use a stress analyzer to test the stress and deflection of a structure. They also design objects, build them with balsa wood, and test the efficiency of these creations.

In the later segments of this module, students design, build, and test more complex structures. These activities help them realize their design skills and their abilities to put engineering principles to work. As a result, they look at buildings, bridges, and other structures with a much more knowledgeable perspective.

<p>Module Hints:</p> <ul style="list-style-type: none"> • Take notes on module lessons, and use them on module lessons quizzes and post tests. • Retake anything that you get a bad grade on!!! <p>Module Grades:</p> <ol style="list-style-type: none"> 1. Pretest: Students will receive a 100 for taking the pretest. 2. Workbook grades are taken from the average of lesson quizzes. 3. Post Test use notes to take post tests. Post test maybe retaken. 4. Module Report: needs to be completed before module will be graded 	GRADE DESCRIPTION	%	
	<u>Pretest Score:</u>		
	<u>Work Book Assignments</u>		
	Matching Activity (Lesson 1)		
	Stress Analyzer Activity 1 (Lesson 3)		
	Stress Analyzer Activity 2 (Lesson 4)		
	Hooke’s Law Activity (Lesson 5)		
	Tension & Compression Activity (Lesson 6)		
	Material Classification Activity 1 (Lesson 7)		
	Material Classification Activity 2 (Lesson 7)		
	<u>Work Book Score:</u>		
	<u>Post Test Score:</u>		

Lesson 1: Force and Area

During this lesson you will:

1. Learn about force
2. Discover 3 types of loads a structure can have.
3. Study the area of an object.

Lesson Hotspots: Take notes on these items.

Force	
Gravity	
Weight	
Mass	

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Dead Loads	
Live Loads	
Dynamic Loads	
Area	

Lesson 2: Equilibrium

During this lesson you will:

1. Learn about the balancing of forces.
2. Build a house of cards to demonstrate the balancing of forces

Lesson Hotspots: Take notes on these items.

Equilibrium	
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Lesson 3: Stress

During this lesson you will:

1. determine what stress is
2. Discover how stress affects different structures
3. Learn how to calculate stress
4. Test a wooden beam for how much stress it can take before breaking.

Lesson Hotspots: Take notes on these items.

Stress	
Load	
Stress Formula	

Lesson 4: Strain and Deflection

During this lesson you will:

1. Discover how engineers relate strain and deflection to stress.
2. Determine how much a structure will bend or twist when forces act on the structure.

Lesson Hotspots: Take notes on these items.

Strain	
Deflection	
Maximum Deflection	

Lesson 5: Hooke's Law

During this lesson you will:

1. Read about Hooke's law, which describes the relationship between stress and strain.
2. Demonstrate Hooke's law

Lesson Hotspots: Take notes on these items.

Hooke's Law	
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Lesson 6: Tension and Compression

During this lesson you will:

1. Learn about tension and compression
2. Discover that materials act differently when they are loaded in tension than when they are loaded in compression.

Lesson Hotspots: Take notes on these items.

Tension	
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Compression	
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Lesson 7: Materials

During this lesson you will:

1. Learn about the different types of materials
2. Analyze the properties of different materials.

Lesson Hotspots: Take notes on these items.

Materials	
Property	
Malleability	
Conductivity	
Ductility	
Elasticity	
Metals	
Alloys	
Non Metals	
Synthetic Materials	
Polymer	
Thermoplastic Polymer	
Thermoset Polymers	
Composites	

- Following the Completion of the module post test students will begin designing a tower that will be built and under go destructive testing on the stress analyzer.
- Tower Designs must include a 3 view orthographic projection drawings and an isometric drawing of the tower before construction may begin.

<p><u>Tower Requirements:</u></p> <ul style="list-style-type: none"> • Maximum Height: 11" • Minimum Height: 10.5" • Load Plate Dimensions: 2" X 2" • Maximum Base 6 ½" X 6 ½" 	Tower Height	
	Tower Area at top:	
	Tower Area at base:	
	Mass of Tower:	