



**Northampton Area School District**

**“Course at a Glance” Grade 7 Seminar – Math (60 Day Rotation)**

Board Approval Date: January 28, 2019

[STEAM 7 Curriculum Cover Sheet](#)

Units of Study (Estimated Time)	Required Assessments/ Activities	Big Idea Essential Questions	PA Core Mathematics Standards	Other PA Standards	Next Generation Science Standards	Resources and Links
<b>Unit 1: Course Introduction (3 Days)</b> <ul style="list-style-type: none"> <li>Introduction to STEAM and STEAM expectations</li> <li>6 Step STEAM Design Process</li> <li>6 STEAM Job Titles</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Group Display Poster w/ classroom expectations</li> </ul>	<b>What is STEAM?</b> <b>What will the STEAM classroom look like?</b> <b>What are the essential parts of a collaborative STEAM challenge/activity.</b> The students will: <ul style="list-style-type: none"> <li>know the meaning of the acronym STEAM</li> <li>know the expectations of a STEAM classroom</li> <li>know the 6 Steps of the STEAM Design Process</li> <li>know the 6 STEAM Job Titles/Roles</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	<a href="http://www.morethanaworksheet.com/2015/07/15/how-to-introduce-steam-expectations/">http://www.morethanaworksheet.com/2015/07/15/how-to-introduce-steam-expectations/</a> Teacher Generated Handouts
<b>Unit 2: Engineering and Design</b> <b>Activity 2A: ‘Book Support’ Activity (1 Day)</b> <ul style="list-style-type: none"> <li>Collaborative group STEAM activity</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Final Textbook Support Tower Worksheet and Rubric</li> </ul>	<b>Can you support a heavy textbook with one piece of paper and small piece of scotch tape?</b> The students will: <ul style="list-style-type: none"> <li>engage in the engineering and design process</li> <li>apply their knowledge of support towers</li> <li>create detailed 2D and 3D sketches of their textbook tower</li> <li>build a final textbook support tower that meets all set requirements</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	<a href="http://www.morethanaworksheet.com/2015/07/15/how-to-introduce-steam-expectations/">http://www.morethanaworksheet.com/2015/07/15/how-to-introduce-steam-expectations/</a> Teacher Generated Handouts

<p><b>Unit 2</b> <b>Activity 2B: 'Basketball Tower' Activity (2 Days)</b></p> <ul style="list-style-type: none"> <li>Collaborative group STEAM activity</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Final Basketball Support Tower Worksheet and Rubric</li> </ul>	<p><b>Can you design a multi-tiered tower using only newspaper and masking tape that can support a basketball?</b> The students will:</p> <ul style="list-style-type: none"> <li>engage in the engineering and design process</li> <li>apply their knowledge of support towers</li> <li>create detailed 2D and 3D sketches of their basketball tower</li> <li>build a final basketball support tower that meets all set requirements</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	freestemchallengebasketballtowerpdf.pdf
<p><b>Unit 2</b> <b>Activity 2C: The Great Desert Island STEM Challenge (4 Days)</b></p> <ul style="list-style-type: none"> <li>Challenge 1: Island Architect: Construct a Hut</li> <li>Math Focus: Area (mini lesson)</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Discuss Best Shapes for the Base of Hut and Calculating the Area</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Final Hut Design, Packet and Rubric</li> </ul>	<p><b>Can you plan, design, and build a hut that can withstand a small windstorm?</b> The students will:</p> <ul style="list-style-type: none"> <li>engage in the engineering and design process</li> <li>understand important aspects of a hut</li> <li>apply their knowledge of aerodynamics</li> <li>calculate area of 2D shapes with respect to their hut design</li> <li>create detailed 2D and 3D sketches of their hut</li> <li>build a final hut product that withstands a windstorm and meets all set requirements</li> </ul>	M07.C-G.2.2.2	S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	STEMActivitiesPackTheGreatDesertIslandSTEMChallenge%20(1).pdf
<p><b>Unit 3</b> <b>Activity 3A: Perimeter and Area of 2D Geometric Shapes (5 Days)</b></p> <ul style="list-style-type: none"> <li>Identify by name common 2D Geometric Shapes</li> <li>Use formulas to evaluate the perimeter and area of 2D shapes.</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>WS to assess prior knowledge</li> <li>Direct Instruction</li> <li>Small Group</li> <li>Independent Practice</li> </ul>	<p><b>Can you identify by name common 2D Geometric Shapes and use formulas to evaluate their perimeter and area?</b> The students will:</p> <ul style="list-style-type: none"> <li>identify by name and sketch common 2D geometric shapes</li> <li>evaluate the perimeter and</li> </ul>	CC.2.3.7.A.1 M07.C-G.2.1.1 M07.C-G.2.1.2 M07.C-G.2.2.1 M07.C-G.2.2.2 CC.2.3.7.A.2 M07.C-G.1.1.1 M07.C-G.1.1.2 M07.C-G.1.1.3 M07.C-G.1.1.4	S8.A.1 & S8.A.2		Teacher Generated WS and Handouts

	<ul style="list-style-type: none"> <li>● Homework WS</li> <li>● Warm-ups</li> <li>● Quiz on 2D Shapes – Perimeter and Area</li> </ul>	<p>area of 2D geometric shapes</p> <ul style="list-style-type: none"> <li>● solve real-world problems involving area and perimeter</li> </ul>				
<p><b>Unit 2</b>  <b>Activity 2D: The Great Desert Island STEM Challenge (5 Days)</b></p> <ul style="list-style-type: none"> <li>● Challenge 2: Crocodile Crossing: Build a Bridge</li> <li>● Math Focus: Measuring with a Ruler (mini lesson)</li> </ul>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> <li>● Brainstorming</li> <li>● Small Group Collaboration</li> <li>● Final Bridge Design, Packet and Rubric</li> <li>● CW/HW WS's on Using a Ruler</li> </ul>	<p><b>Can you plan, design, and build a bridge that can hold weight?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>● engage in the engineering and design process</li> <li>● understand important aspects of a bridge</li> <li>● apply their knowledge of structural design</li> <li>● create detailed 2D and 3D sketches of their bridge</li> <li>● build a final bridge product that spans a 10” gap, supports weight, and meets all set requirements</li> <li>● know how to read and use a ruler to measure</li> </ul>	M07.A-N.1.1.1	S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	STEMActivitiesPackTheGreatDesertIslandSTEMChallenge%20(1).pdf
<p><b>Unit 4: Creative Thinking, Perspectives, and Teamwork (5 Days)</b></p> <ul style="list-style-type: none"> <li>● Individual and group activities focused on creative thinking, perspectives, and teamwork led by art teacher, Erin Miller.</li> </ul>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> <li>● Brainstorming</li> <li>● Small Group Collaboration</li> <li>● Creative Thinking WS's</li> <li>● Drawing/Sketching using different perspectives</li> <li>● Team Activities</li> </ul>	<p><b>How does creative thinking, perspectives, and teamwork enhance one's ability to complete STEAM activities?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>● know what creative thinking is</li> <li>● use different perspective to expand their creative thinking to develop unique ideas</li> <li>● know how to effectively work in teams and understand the importance of small group collaboration for successfully completing STEAM challenges</li> </ul>		S8.A.1 & S8.A.2		Teacher Generated Handouts
<p><b>Unit 3</b>  <b>Activity 3B: Area and Volume of 3D</b></p>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> </ul>	<p><b>Can you identify by name common 3D Geometric</b></p>	CC.2.3.7.A.1 M07.C-G.2.1.1	S8.A.1 & S8.A.2		Teacher Generated WS and Handouts

<p><b>Geometric Shapes (5 Days)</b></p> <ul style="list-style-type: none"> <li>Identify by name common 3D Geometric Shapes</li> <li>Use formulas to evaluate the area and volume of 3D shapes.</li> </ul>	<ul style="list-style-type: none"> <li>WS to assess prior knowledge</li> <li>Direct Instruction</li> <li>Small Group</li> <li>Independent Practice</li> <li>Homework WS</li> <li>Warm-ups</li> <li>Quiz on 3D Shapes – Area and Volume</li> </ul>	<p><b>Shapes and use formulas to evaluate their area and volume?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>identify by name and sketch common 3D geometric shapes</li> <li>evaluate the area and volume of 3D geometric shapes</li> <li>solve real-world problems involving area and volume</li> </ul>	<p>M07.C-G.2.1.2 M07.C-G.2.2.1 M07.C-G.2.2.2 CC.2.3.7.A.2 M07.C-G.1.1.1 M07.C-G.1.1.2 M07.C-G.1.1.3 M07.C-G.1.1.4</p>			
<p><b>Unit 2</b> <b>Activity 2E: The Great Desert Island STEM Challenge (4 Days)</b></p> <ul style="list-style-type: none"> <li>Challenge 3: Message in a Bottle: Waterproof Container</li> <li>Math Focus: 3D objects; Area and Volume (mini lesson)</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Final Waterproof Container, Packet and Rubric</li> </ul>	<p><b>Can you plan, design, and construct a watertight container that can float to deliver a message?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>engage in the engineering and design process</li> <li>understand important aspects of a waterproof container</li> <li>apply their knowledge of floatation and waterproofing</li> <li>create detailed 2D and 3D sketches of their waterproof container</li> <li>build a final waterproof container product that floats, keeps water out, and meets all requirements</li> </ul>	<p>M07.C-G.2.2.2</p>	<p>S8.A.1 &amp; S8.A.2</p>	<p>MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C</p>	<p>STEMActivitiesPackTheGreatDesertIslandSTEMChallenge%20(1).pdf</p>
<p><b>Unit 2</b> <b>Activity 2F: The Great Desert Island STEM Challenge (5 Days)</b></p> <ul style="list-style-type: none"> <li>Challenge 4: Pirate Defense: Coconut Catapult</li> <li>Math Focus: Add/Subtract with a Number line (mini lesson)</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Brainstorming</li> <li>Small Group Collaboration</li> <li>Final Marshmallow Catapult, Packet and Rubric</li> </ul>	<p><b>Can you plan, design, and create a device that can launch a projectile at least 12”?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>understand important aspects of a catapult</li> <li>apply their knowledge of structural design and catapultian</li> <li>create detailed 2D and 3D sketches of their catapult</li> </ul>	<p>M07.A-N.1.1.2</p>	<p>S8.A.1 &amp; S8.A.2</p>	<p>MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C</p>	<p>STEMActivitiesPackTheGreatDesertIslandSTEMChallenge%20(1).pdf</p>

		<ul style="list-style-type: none"> <li>● build a final catapult product that launches a marshmallow 12” forward in the air and meets all set requirements</li> </ul>				
<b>Unit 2</b> <b>Activity 2G: The Great Desert Island STEM Challenge (4 Days)</b> <ul style="list-style-type: none"> <li>● Challenge 5: Float Your Boat: Raft Design</li> <li>● Math Focus: Multi-step Real World Problem-Solving with Integers (mini lesson)</li> </ul>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> <li>● Brainstorming</li> <li>● Small Group Collaboration</li> <li>● Final Raft Design, Packet and Rubric</li> </ul>	<b>Can you plan, design, and build a raft with a mast that floats and holds weight?</b> The students will: <ul style="list-style-type: none"> <li>● engage in the engineering and design process</li> <li>● understand important aspects of a raft</li> <li>● apply their knowledge of structural design and floatation</li> <li>● create detailed 2D and 3D sketches of their raft</li> <li>● build a final raft product that floats for 2 min. while holding at least 5 pennies and meets all set requirements</li> </ul>	M07.B-E.2.1.1	S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	STEMActivitiesPackTheGreatDesertIslandSTEMChallenge%20(1).pdf
<b>Unit 2</b> <b>Activity 2H: ‘Can You Canoe?’ Activity (5 Days)</b> <ul style="list-style-type: none"> <li>● Collaborative group STEAM activity</li> </ul>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> <li>● Brainstorming</li> <li>● Small Group Collaboration</li> <li>● Final Canoe Design, Packet and Rubric</li> </ul>	<b>How does structural engineering and design work?</b> <b>Can you plan, design, and build a canoe that floats and holds weight?</b> The students will: <ul style="list-style-type: none"> <li>● engage in the engineering and design process</li> <li>● understand important aspects of a canoe</li> <li>● understand how the design of the canoe has evolved over the years</li> <li>● apply their knowledge of structural design, floatation, and streamline</li> <li>● create detailed 2D and 3D sketches of their canoe</li> <li>● build a final canoe product that floats for 2 ½ min. while holding at least 25 pennies and meets all set</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	<a href="http://tryengineering.org/lessons/canucanoe.pdf">http://tryengineering.org/lessons/canucanoe.pdf</a> Teacher Generated Handouts and Rubric

		requirements				
<p><b>Unit 5: STEAM Activities in our Makerspace Lab (5 Days)</b></p> <ul style="list-style-type: none"> <li>Collaborative group STEAM activities conducted in our Makerspace Lab and led by librarian, Claudine Smith</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Modeling</li> <li>Small Group Collaboration</li> <li>Creative Thinking Stations in the Makerspace Lab involving STEAM</li> <li>Daily Reflection Logs on Schoology</li> <li>Final Makerspace Project on Schoology</li> </ul>	<p><b>How does collaborative group STEAM activities conducted in our Makerspace Lab enhance one’s ability to problem solve and find creative solutions?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>explore multiple (5) STEAM activities at different stations in the Makerspace Lab</li> <li>use creative thinking and problem-solving skills to complete the tasks at each station.</li> <li>identify what field of STEAM each station is most closely related to.</li> <li>make connections to the real-world</li> <li>develop an original, creative solution to an individual problem by combining aspects of two current products</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	Teacher Generated Activities and Graded Assignments on Schoology.
<p><b>Unit 2</b></p> <p><b>Activity 2I: Cardboard Boat Prototype Activity (5 Days)</b></p> <ul style="list-style-type: none"> <li>Create 2D scale drawings and 3D sketch for the cardboard boat prototype</li> <li>Create a 3D prototype model of your cardboard boat out of a manila folder and clear scotch tape.</li> </ul>	<ul style="list-style-type: none"> <li>Whole-Class Discussion</li> <li>Direct Instruction</li> <li>Modeling</li> <li>Brainstorming</li> <li>Scale Drawings</li> <li>WS on Scale Factors/Ratios</li> <li>Final Cardboard Boat Prototype</li> </ul>	<p><b>Can you create 2D scale drawings and 3D sketch for the cardboard boat prototype?</b></p> <p><b>Can you plan, design, and build a 3D prototype model of a cardboard boat?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>understand important structural aspects of a boat</li> <li>understand the capabilities and limitations of provided</li> </ul>		S8.A.1 & S8.A.2	MS-ETS1-1 MS-ETS1-2 ETS1.A ETS1.B ETS1.C	Teacher Generated Handouts and Rubric.

	Design, Packet and Rubric	<p>materials (Cardboard and Masking Tape)</p> <ul style="list-style-type: none"> <li>● use scale factor and ratios to solve real-life problems</li> <li>● understand the meaning of prototype</li> <li>● create 2D scale drawings of their cardboard boat prototype</li> <li>● create a physical prototype for their cardboard boat using manila folder and scotch tape</li> </ul>				
<p><b>Unit 6: Applying Mathematical Concepts (2 Days)</b></p> <ul style="list-style-type: none"> <li>● %, ratios, final cost, exponents, distributive property, CLT</li> <li>● Two one-day lessons conducted periodically throughout the course</li> </ul>	<ul style="list-style-type: none"> <li>● Whole-Class Discussion</li> <li>● Direct Instruction</li> <li>● Modeling</li> <li>● Independent Practice</li> <li>● Homework WS</li> </ul>	<p><b>Can you use mathematical concepts to solve problems?</b></p> <p>The students will:</p> <ul style="list-style-type: none"> <li>● use %, ratios, discounts, exponents, distributive property, and CLT to solve 7<sup>th</sup> Grade PSSA Math problems</li> </ul>	<p>CC.2.1.7.D.1 M07.A-R.1.1.1 M07.A-R.1.1.2 M07.A-R.1.1.3 M07.A-R.1.1.4 M07.A-R.1.1.5 M07.A-R.1.1.6 CC.2.2.7.B.1 M07.B-E.1.1.1</p>	S8.A.1 & S8.A.2		Teacher Generated WS and Handouts
<b>Total Course Length (60 Days)</b>						