Southern Lehigh School District

UbD Curriculum Template

Course: **5th Grade STEM** Unit: **Robotics and Coding** Grades: **5**

Teacher Team: **Bennett** Date: **June, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Effective Communication Skills
   Problem-solving
   Career Planning and Life-Long Learning
   Adaptation and flexibility

2. What content standards will this unit address?

   - ELA PA Core State Standards
     CC.1.2.5.F
     Determine the meaning of words and phrases as they are used in grade level text, including interpretation of figurative language.
     CC.1.2.5.J
     Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships.

     CC.1.2.5.K
     Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade level reading and content, choosing flexibly

Enduring Understandings/Transfer

Written as a declarative statement, an enduring understanding is a "big idea" that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.

3. List the Enduring Understanding(s):
   Robotics technology enhances design, construction, industry, and manufacturing.
   Debugging is a methodical process of finding and reducing the number of defects in coding
   Communication and collaboration are essential to efficient and effective problem solving.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   ** Students will understand how robots are used in different fields.*
   ** Students will understand how to use the program software to write code.*
   ** Students will interact and communicate appropriately and effectively.*

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   What does it look like to work as a team to solve a problem?
   What is the creative problem-solving process?
   In the creative problem-solving process, why is it important to acknowledge our successes, celebrate our failures and modify our ideas or products?

Acquisition

Students will know...	Students will be skilled at... (be able to do)
6. What facts should students know and be able to use to gain further knowledge? *Students will know how to code a robot to combine*	9. What discrete skill and processes should students be able to demonstrate? *E05.B-V.4.1.1 Determine or clarify the meaning of*

from a range of strategies and tools.
CC.1.3.5.F
Determine the meaning of words and phrases as they are used in grade level text, including interpretation of figurative language.
CC.1.3.5.I
Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies and tools.
CC.1.3.5.J
Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships.

- Math PA Core State Standards
  CC.2.4.4.A.1
  Solve problems involving measurement and conversions from a larger unit to a smaller unit.
- PA Content Standards
  3.4.5.A1
  Explain how people use tools and techniques to help them do things.
  3.4.5.C2
  Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.
  3.4.5.E4
  Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.

movements to continuously move around objects in the classroom.
Students will know that robots can break so they should be lifted with two hands and be kept on the floor at all times.
Students will know that robots can be programmed to do bad things.

7. What vocabulary should students know and be able to recall?
   Computer Science, Coding, Algorithm, Input, Output, Operator, Procedure, Variable, Debugging, Sensors, Control System, Pre-Programmed, Motor, Central Processing Unit (CPU), Space, Exploration, National Aeronautics and Space Administration (NASA), Impacts, Seconds, Degrees, Rotations, Icon, Gears, Display, Movement

8. What basic concepts should students know and be able to recall and apply?
   Recall Basic Robot Movements from 4th grade: Forward, Backward, Right Turn, Left Turn
   Understanding the Robotics Program on the computer.

unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies. a. Use context (e.g., cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase. b. Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., photograph, photosynthesis). c. Determine the meaning of general academic and domain-specific words and phrases used in a text.

S5.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., investigate to find out if all clay or foil boats designs react the same when filled with paperclips).
S6.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., consumer product testing, common usage of simple machines, modern inventions).
S5.A.2.1.1 Design a simple, controlled experiment (fair test) identifying the independent and dependent variables, how the dependent variable will be measured and which variables will be held constant (e.g., relate the effect of variables [mass, release height, length of string] to number of swings of a pendulum, investigate the relationships between variables in paper airplane designs).
S6.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., consumer product testing, common usage of simple machines, modern inventions).

Students will be skilled at using information they learned in 4th grade to determine what coding icon to use in the computer program to make a robot move forward, backward, left, and right.
Students will be skilled at coding a robot to combine

		movements to continuously move. *Students will be skilled at troubleshooting to solve any problems they encounter.* *Students will be skilled at safe handling of technology.* *Students will be skilled at demonstrating the elements of teamwork and collaboration.*

Stage 2 – Evidence	
NETS for Students	**PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning**
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Communication and Collaboration* *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4): *Complete an activity that they use what they learned in 4th grade: forward, backward, turn left, turn right, and combine movements together, to create a continuous program to move around obstacles in the classroom. (Transfer: Students will use these movements in higher grades and will be combining them together to make more complex programs.)*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Assignment to move the robots that are graded based upon completion of the code, written code on a worksheet, and teamwork.*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Communication and Collaboration*	Questions to consider while planning: • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students?	• **How will you monitor students' progress toward acquisition, meaning, and transfer during learning activities?** Observation Discussion Review of robots code • **What are potential rough spots and student misunderstandings?** Confusion over the difference between seconds and

<table>
<tr><td rowspan="2">Critical Thinking
Technology Operations</td><td colspan="2"></td><td>rotations in the robot's code.
What to do if the robot stops working.

• How will students get the feedback they need?
After they program the robot they show me how they have made it work.</td></tr>
<tr><td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

Work with a partner to complete the robot activity.
Complete the robot coding/programming worksheet.</td><td>List resources required
(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)
Programmable robots.
Programmable robots software (Currently using Lego Mindstorms).
Computers
Coding/programming worksheet.</td><td>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.

Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb

Check-in after each assignment.</td></tr>
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Southern Lehigh School District

UbD Curriculum Template

Course: **5th Grade STEM** Unit: **Product Design** Grades: **5**

Teacher Team: **Bennett** Date: **June, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Effective Communication Skills
   Problem-solving
   Career Planning and Life-Long Learning
   Adaptation and flexibility

2. What content standards will this unit address?

   - ELA PA Core State Standards
     CC.1.2.4.F: Determine the meaning of words and phrases as they are used in grade level text, including figurative language.
     CC.1.2.4.A: Determine the main idea of a text and explain how it is supported by key details; summarize the text.
     CC.3.5.6-8.B : Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

   - Math PA Core State Standards
     CC.2.1.5.B.2
     Extend an understanding of operations with whole numbers to perform operations including decimals.

Enduring Understandings/Transfer

Written as a declarative statement, an enduring understanding is a "big idea" that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.

3. List the Enduring Understanding(s):
   No design is perfect and changes can always be made to improve a design.
   Engineering Design Process and Technological Design Loop are how creative ideas are turned into inventions and innovations.
   Manufacturing encompasses many processes to complete a desired product.
   Manufactured products have advantages and disadvantages.
   Communication and collaboration are essential to efficient and effective problem solving.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   Students will know how to build a model of a product that they designed.
   Students will know how to test their product and determine if it is a success or if modifications need to be made.
   Students will know how to calculate acceleration.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   What are the steps of the Technological Design Loop?
   What does it look like to work as a team to solve a problem?
   How can The Technological Design Loop be used to design a product?
   In the creative problem solving process, why is it important to acknowledge our successes, celebrate our failures and modify our ideas or products?
   How do magnets work?

• PA Content Standards		
	Acquisition	
3.4.5.A1 *Explain how people use tools and techniques to help them do things.* *3.4.5.A3* *Describe how technologies are often combined.* *3.4.5.B4* *Identify how the way people live and work has changed history in terms of technology.* *3.4.5.C1* *Explain how the design process is a purposeful method of planning practical solutions to problems* *3.4.5.C2* *Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.* *3.4.5.C3* *Identify how invention and innovation are creative ways to turn ideas into real things.* *3.4.5.D1* *Identify ways to improve a design solution.* *3.4.5.D2* *Use information provided in manuals, protocols, or by experienced people to see and understand how things work.* *3.4.5.D3* *Determine if the human use of a product or system creates positive or negative results.* *3.4.5.E4* *Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.*	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *Students will know how to build a model of a product that they designed.* *Students will know how to test their product and determine if it is a success or if modifications need to be made.* *Students will know how to calculate acceleration.* *Students will know how magnets work.* 7. What vocabulary should students know and be able to recall? *Criteria, Constraints, Aerodynamics, Isometric, Friction, acceleration, descent, distance, elevation, magnet, magnetic field, magnetic levitation, theoretical, velocity* 8. What basic concepts should students know and be able to recall and apply? *Understand that no design is perfect and changes can always be made to improve a design.* *Understand that manufacturing takes many processes to complete a desired product.* *The use of the engineering design process and the technological design loop are how creative ideas are turned into inventions and innovations.* *Communication and collaboration are essential to efficient and effective problem solvings.* *Manufactured products can have advantages and disadvantages.* *Understand what magnets can do and what they can be used for.*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *M05.A-T.2.1.3 Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).* *S5.A.2.2.1 Describe the appropriate use of instruments and scales to accurately measure time, mass, distance, volume, and temperature safely under a variety of conditions (e.g., use a thermometer to observe and compare the interaction of food coloring in water at different temperatures).* *S5.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., investigate to find out if all clay or foil boats designs react the same when filled with paperclips).* *S5.A.2.1.1 Design a simple, controlled experiment (fair test) identifying the independent and dependent variables, how the dependent variable will be measured and which variables will be held constant (e.g., relate the effect of variables [mass, release height, length of string] to number of swings of a pendulum, investigate the relationships between variables in paper airplane designs).* *S5.A.1.1.3 Describe how explanations, predictions, and models are developed using evidence.* *Students will be skilled at measuring to the nearest 1/8"* *Students will be skilled at sketching multiple designs of ideas for their product.* *Students will be skilled at using a hot wire cutter safely and accurately.* *Students will be skilled at using the correct sand*

4.5.5.D *Explain how different items are recycled and reused.* *Careers:* *13.3.5.B* *Explain the importance of working cooperatively with others at both home and school to complete a task.*		*paper for the job, in the correct manner.* *Students will be skilled at assembling their project to work in the desired way.* *Students will be skilled at troubleshooting to solve any problems they encounter.* *Students will be skilled in using basic equations to solve math problems.*

Stage 2 – Evidence	
NETS for Students	**PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning**
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Communication and Collaboration* *Critical Thinking* *Technology Operations* *Creative and Innovation* *Research and Information Fluency*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4): *Measuring activity. (Transfer: Students need to know how to measure to complete all of their projects.)* *Powerpoint on The Technological Design Process and note taking sheet. (Transfer: The Technological Design Process is the back bone of STEM and students will use this process with every project they do.* *Aerodynamics sheet. (Transfer: Students will need to know the basics about aerodynamics for their cars and for other STEM classes.* *MagLev Car Design Packet. (Transfer: Students complete a design packet, set up the same way as this packet, to complete every STEM project in my class.* *Calculating Acceleration. (Transfer: Students use the same math in other classes that is needed to complete this assignment.)* *Create a model of a MagLev train. (Transfer: Students will learn how to use tools and machines necessary in other classes.)* *Reflection at the end of the project on why working together in school is helpful when learning how to work together at a job.*

	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Complete the MagLev Car Design Packet.*

Stage 3 – Learning Plan			
NETS for Students	**Learning Activities**		**Progress Monitoring/Formative Assessment**
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Communication and Collaboration* *Critical Thinking* *Technology Operations* *Research and Information Fluency* *Creative and Innovation*	Questions to consider while planning: • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students?		• **How will you monitor students' progress toward acquisition, meaning, and transfer during learning activities?** Observation Discussion Design challenge packet • **What are potential rough spots and student misunderstandings?** What to do if their car doesn't work. • **How will students get the feedback they need?** Students fill in their information in the Design Packet. Students will test their cars to see if they work, if they don't they can retest it.
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: The Technological Design Process Powerpoint and note-taking guide. Aerodynamics sheet. Magnets Sheet. Orthographic Projection. Hot wire cutter demonstration. Sanding Demonstration. MagLev Car Design Packet.	**List resources required** *(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)* The Technological Design Process? Powerpoint and powerpoint hand out. MagLev Car Design Packet. Foam. Hot wire cutter. Sand paper 80, 120, 220 grits. Cardboard base.	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* Design Process notes sheet and exit ticket. Aerodynamics sheet. MagLev car testing.

		Magnets. MagLev car race track. Scissors. Computers. Permanent Markers.	

Southern Lehigh School District

UbD Curriculum Template

Course: **5th Grade STEM** Unit: **Structural Design** Grades: **5**

Teacher Team: **Bennett** Date: **March, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Effective Communication Skills
   Problem-solving
   Career Planning and Life-Long Learning
   Adaptation and flexibility

2. What content standards will this unit address?

   - ELA PA Core State Standards
     CC.1.2.4.F: Determine the meaning of words and phrases as they are used in grade level text, including figurative language.
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     CC.3.5.6-8.B : Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

   - Math PA Core State Standards
     CC.2.1.5.B.2
     Extend an understanding of operations with whole numbers to perform operations including decimals.

Enduring Understandings/Transfer

Written as a declarative statement, an enduring understanding is a "big idea" that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.

3. List the Enduring Understanding(s):
   No design is perfect and changes can always be made to improve a design.
   Engineering Design Process and the Technological Design Loop are how creative ideas are turned into inventions and innovations.
   Communication and collaboration are essential to efficient and effective problem solvings.
   Structures are designed to provide solutions to a human need
   Fossil fuels are diminishing and other options are avialable to create electricity.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   ** Students will know how to build a model of a product that they designed.*
   ** Students will know the difference between renewable, non-renewable, and inexhaustible resources.*

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   What are the steps of the Technological Design Loop?
   What does it look like to work as a team to solve a problem?
   How can The Technological Design Loop be used to design a product?
   In the creative problem solving process, why is it important to acknowledge our successes, celebrate our failures and modify our ideas or products?
   What impact would switching from fossil fuels to inexhaustible resources have on our society?

	Acquisition	
• PA Content Standards *3.3.5.A2* *Describe the usefulness of Earth's physical resources as raw materials for the human made world.* *3.4.5.A1* *Explain how people use tools and techniques to help them do things.* *3.4.5.A3* *Describe how technologies are often combined.* *3.4.5.B4* *Identify how the way people live and work has changed history in terms of technology.* *3.4.5.C1* *Explain how the design process is a purposeful method of planning practical solutions to problems* *3.4.5.C2* *Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.* *3.4.5.C3* *Identify how invention and innovation are creative ways to turn ideas into real things.* *3.4.5.D1* *Identify ways to improve a design solution.* *3.4.5.D2* *Use information provided in manuals, protocols, or by experienced people to see and understand how things work.* *3.4.5.D3* *Determine if the human use of a product or system creates positive or negative results.* *3.4.5.E4*	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *Students will know how to build a model of a product that they designed.* *Students will know the difference between renewable, non-renewable, and inexhaustible resources.* *Students will know how to use basic math to budget money to buy supplies for their project.* 7. What vocabulary should students know and be able to recall? *Criteria, Constraints, Renewable resources, Non renewable resources, Inexhaustible resources, Wind mill, Wind turbine, Energy, Electricity, Petroleum, Hydroelectric, Coal, Nuclear, Horizontal axis turbine, Vertical axis turbine, Variable, Blade, Axis, Alternative energy, Energy source* 8. What basic concepts should students know and be able to recall and apply? *Understand that no design is perfect and changes can always be made to improve a design.* *Understand that fossil fuels are diminishing and other options are available to create electricity.* *The use of the engineering design process and the technological design loop are how creative ideas are turned into inventions and innovations.* *Communication and collaboration are essential to efficient and effective problem solvings.* *Understanding that budgeting is important when designing a product.*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students is able to demonstrate? *M05.A-T.2.1.3 Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).* *S5.B.3.2.1 Identify fossil fuels and alternative fuels used by humans.* *S5.A.2.2.1 Describe the appropriate use of instruments and scales to accurately measure time, mass, distance, volume, and temperature safely under a variety of conditions (e.g., use a thermometer to observe and compare the interaction of food coloring in water at different temperatures).* *S5.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., investigate to find out if all clay or foil boats designs react the same when filled with paperclips).* *S5.A.2.1.1 Design a simple, controlled experiment (fair test) identifying the independent and dependent variables, how the dependent variable will be measured and which variables will be held constant (e.g., relate the effect of variables [mass, release height, length of string] to number of swings of a pendulum, investigate the relationships between variables in paper airplane designs).* *S5.A.1.1.3 Describe how explanations, predictions, and models are developed using evidence.* *S5.B.3.2.1 Identify fossil fuels and alternative fuels used by humans.* *Students will be skilled at measuring to the nearest 1/8"* *Students will be skilled at using basic math to budget the money they need to buy supplies.* *Students will be skilled at sketching multiple designs*

Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas. *4.5.5.D* *Explain how different items are recycled and reused.* *Careers:* *13.3.5.B* *Explain the importance of working cooperatively with others at both home and school to complete a task.* *13.3.5.D* *Explain budgeting.*		*of ideas for their product.* *Students will be skilled at assembling their project to work in the desired way.* *Students will be skilled at troubleshooting to solve any problems they encounter.* *Students will be skilled at researching information on resources.*

Stage 2 – Evidence	
NETS for Students	**PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning**
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Communication and Collaboration* *Critical Thinking* *Technology Operations* *Creative and Innovation* *Research and Information Fluency*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4): *Complete an inquiry based research project on the basics of wind turbines.(Transfer: students will need to work collaboratively throughout their school career.)* *Use the research information they found to share with the class so they can use that information to complete their Wind Turbine Design packet. (Transfer: Students will complete design packets with every project they complete in my class and future STEM classes)* *Create a supplies list and budget their money to stay under a certain amount of money. (Transfer: Students will need to budget their money throughout their life.)* *Build a model based on the Wind Turbine Design Packet. (Transfer: Students will use this skill again in future STEM classes.)* *Test the model to lift at least ten pennies. (Transfer: Students will use this skill in other classes in the future.)* *Reflection at the end of the project on why working together in school is helpful when learning how to work together at a job.* *Performance task on budgeting for their project.*

	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Create a supplies list and stay under budget.* *Build a working wind turbine and have it lift at least ten pennies.*

<table>
<tr><th colspan="4">Stage 3 – Learning Plan</th></tr>
<tr><th>NETS for Students</th><th colspan="2">Learning Activities</th><th>Progress Monitoring/Formative Assessment</th></tr>
<tr><td rowspan="2">NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.

Communication and Collaboration
Critical Thinking
Technology Operations
Research and Information Fluency
Creative and Innovation</td><td colspan="2">Questions to consider while planning:
• Are transfer and acquisition addressed in the learning plan?
• Does the learning plan reflect principles of learning and best practices?
• Is there tight alignment with Stages 1 and 2?
• Is the plan likely to be engaging and effective for all students?</td><td>• How will you monitor students' progress toward acquisition, meaning, and transfer during learning activities?
Observation
Discussion
Design challenge packet
• What are potential rough spots and student misunderstandings?
What to do if their turbine doesn't work.

• How will students get the feedback they need?
Students will have me hand them their supplies and check their supply list.
Students will test their turbine to make sure it works before it is tested with the class.</td></tr>
<tr><td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

What is energy? Powerpoint and note-taking guide.
Wind Turbine Inquiry Notes Project.</td><td>List resources required
(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)
Wind Turbine Inquiry Notes papers.
What is Energy? Powerpoint and powerpoint hand out.</td><td>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.

Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb

Wind Turbine Inquiry Notes Project.
Wind turbine budget check list.
Turbine Design Sketches.</td></tr>
</table>

	Wind Turbine Design Packet.	Wind Turbine Design Packet. Straws, skewers, tape, model magic, index cards, dixie cups, popsicle sticks, and string to create models. Scissors. Computers. Box fan. Cardboard stands to test turbines. Permant Markers. Pennies.	