Building A Mini Weather Station

Worth up to 10 additional points for your current quarter grade, and an increase in your license to learn level.

****Important Notes:**

- **You are allowed to work with one additional student on this project. Each student will receive an identical grade for the final product.**
- **Your end of quarter grade cannot exceed 100%. Any remaining points from this and other extension projects will be moved to the following quarter.**
- **You will be provided with two to three small syringes and a length of pvc tubing that fits tightly on the ends of the syringes. These materials are only handed out when your design and research have been completed and you have met with me.**

Goal of Extension Project: Students will design a mini-weather station by picking three different weather instruments, building the weather station, and testing its effectiveness.

Overview:

Our Earth is a diverse, changing landscape and one of the biggest components for change is the weather. Here in New England our weather can change drastically in a few hours, at 4pm it might be 0 degrees and twelve hours later it is nearly 55 degrees. The same thing goes for changes in wind speed, humidity levels and barometric pressure levels. For this out of class project you will be building and testing THREE different meteorological instruments. Accompanying your instruments you will need to include a specific set of instruction on how to use each of the instruments and a set of test data from your instruments. Finally, you will need to include a final communication on the performance of the instruments. Follow the steps below for complete details. Imagine that you work for ***Stark Industries***, a meteorological instrument supply facility. At Stark Industries, only the finest meteorological devices are manufactured and you are one of our head engineers. You have been given this task:

Step #1 - Research:

Decide: You will pick **<u>three</u>** instruments from the list below to build and test and include in your weather station, but before you decide on the three you want to build you will have to do some research. Complete the table on the following page with information pertaining to each weather instrument.

- Barometer
- Hygrometer
- Thermometer
- Anemometer
- Psychrometer
- Wind Vane
- Rain Gauge

Instrument	Main functions as a weather tool (its main job)	Importance as a weather prediction tool	Description of how the weather tool works
Barometer			
Hygrometer			
Thermometer			
Anemometer			
Psychrometer			
Wind Vane			
Rain Gauge			

Now that you have taken the time to identify the functions and value of each meteorological tool, you need to determine which three you are going to build and where you are going to get your information from. *Circle* which three weather instruments you would like to build in the table above. On the next page you will have to do a bit more research to find appropriate resources that will guide you through the building process.

Step #2 - Design:

Now that you have some solid information under your belt, it is time to design your weather instruments! You will need to provide a list of materials, the tools you will need to build each weather instrument, and a clearly detailed drawing of each of your weather instruments. Label all components on your drawing clearly and make sure it is easy for another person to make sense of what your plans are.

Instrument #1 Name: _____

Materials / supplies needed to build the instrument (include quantities):

( )
( )
( )
( )
( )
( )
( )

Tools needed to build the instrument:

-
-
-
-
-

Resources used to design and build the weather instrument (include full website address and/or full book title and author) - you must have at least one credible resource:

Final, fully-labeled drawing of the weather instrument:

Instrument #2 Name: _____

Materials / supplies needed to build the instrument (include quantities):

( )
( )
( )
( )
( )
( )
( )

Tools needed to build the instrument:

-
-
-
-
-

Resources used to design and build the weather instrument (include full website address and/or full book title and author) - you must have at least one credible resource:

Final, fully-labeled drawing of the weather instrument:

Instrument #3 Name: _____

Materials / supplies needed to build the instrument (include quantities):

( )
( )
( )
( )
( )
( )
( )

Tools needed to build the instrument:

-
-
-
-
-

Resources used to design and build the weather instrument (include full website address and/or full book title and author) - you must have at least one credible resource:

Final, fully-labeled drawing of the weather instrument:

Signature to Proceed to Building Process X_____

Step #3 - Build and record:

Once you have the “go ahead” to proceed, figure out your plan of action, gather up your materials and begin the building process. Please do the following while you build:

- Record the materials and methods used to build the weather instruments
- Take ***photographs and video record*** the entire building process so that we can see how you actually accomplished this task (you should have a minimum of ***twenty*** pictures or 3 minutes of video footage to use for the final communication)
- Test your weather tools and record how they perform, then adjust them to make them perform better, record this data. You should take photos / videos of them doing their jobs.
    - Be creative, use parts of old and/or broken toys, appliances, or anything else that is probably destined for a landfill
    - Be ingenuitive, take the time to find that perfect “something” that does the job. Think gears, metal rods, paperclips, springs, or anything else that completes the job.
    - Don’t settle, once you think the solar oven is good, test it, test it again, and then once more, make modifications to make it the best you possibly can. Take your time with this, but don’t stress, have fun… **and do your research!!!**

Test your weather tools: Pick ***three*** different days to test your instruments and include a “weather report” for each of those days which will include:

1. The date and time
2. Visible weather conditions (precipitation, cloud coverage, etc…)
3. Location of testing
4. Measured data using your two instruments

Step #4 - Communicate the project:

You ***WILL NOT*** use google slideshow to communicate your information. Those days are done. Let's use something that will reach more people and will insure that the quality of the work you are creating is above and beyond the norm. You have three options to communicate your project.

- One option is using **Youtube** to create a "build it" video with the purpose of instructing another person on how to build your machine and use it.
- Option two is to complete an **instructable** by signing up (via your WRSD account) for instructables at https://www.instructables.com/account/register/ and linking your google account. You should familiarize yourself with the process of creating an instructable by exploring other people's instructables and seeing what makes a good one and what makes a bad one.
- The third option is to create a clear poster presentation to be hung up outside the classroom. Basically you are creating a paper version of an instructable.

No matter which option you choose, your form of communication must include the following:

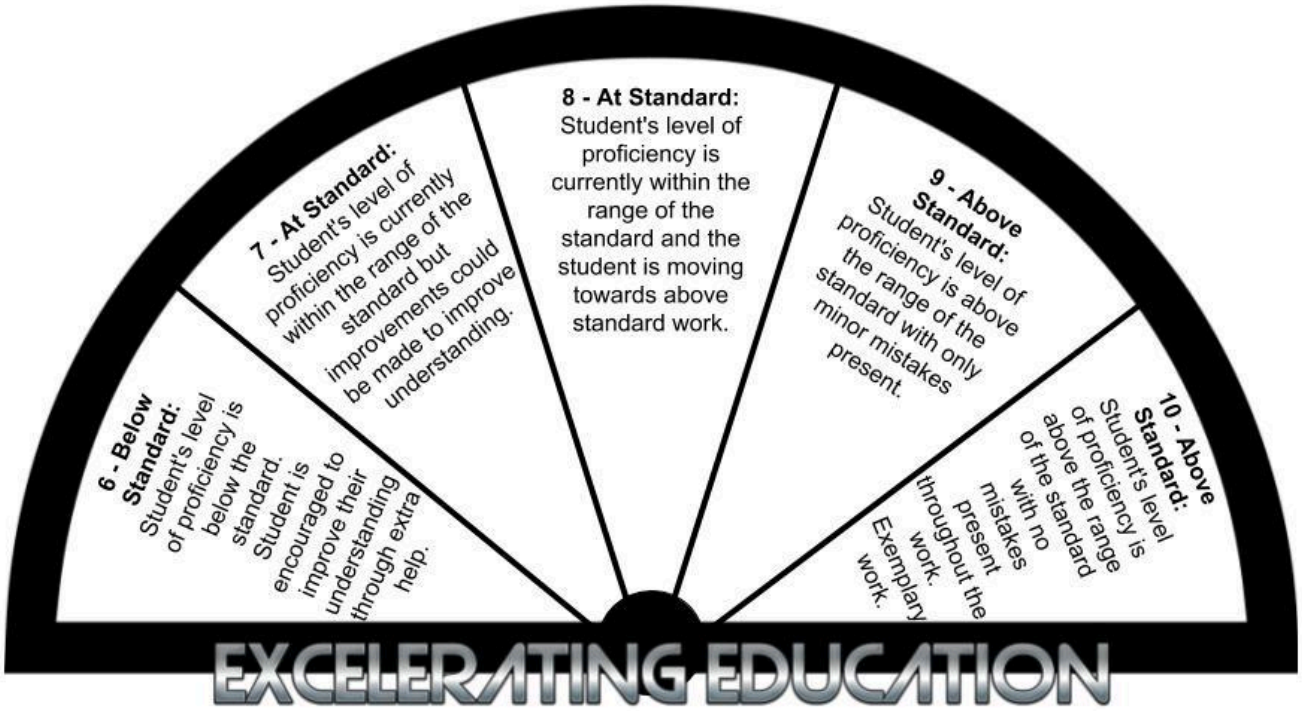
1. An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
2. Introduce your weather instruments and talk about what what properties of weather your instruments measure and how your particular instruments measure these properties (i.e. a rain gauge measures centimeters of rain). Describe where you got your information from to design and build the tools you decided to build.
3. Describe the design process for the tools.
4. Describe the necessary tools, materials, and skills needed for the project
5. Include Video footage and / or pictures of the building process
6. Include Video footage and / or pictures of the testing process
7. Answer these question in your communication: What importance do your instruments have with meteorology? Why do meteorologists use instruments such as the one you made.
8. Describe how your three meteorological tools compare to the tools professionals use. Search for images of your three instruments on a search browser such as "Google" or "Bing" and compare and contrast your tools to "professional" tools.
9. Describe your weather report for the three days you tested your weather instruments.
10. Answer this question in your communication: Based upon your testing (all three days), are your instruments accurate? *How do you know? Use evidence from your testing to prove that your instruments are either accurate or inaccurate.*
11. Describe any ways that your tools could be improved to be more accurate and conclude your communication.

Rubrics for different forms of communication:

Youtube Video Rubric

Did the communication include…

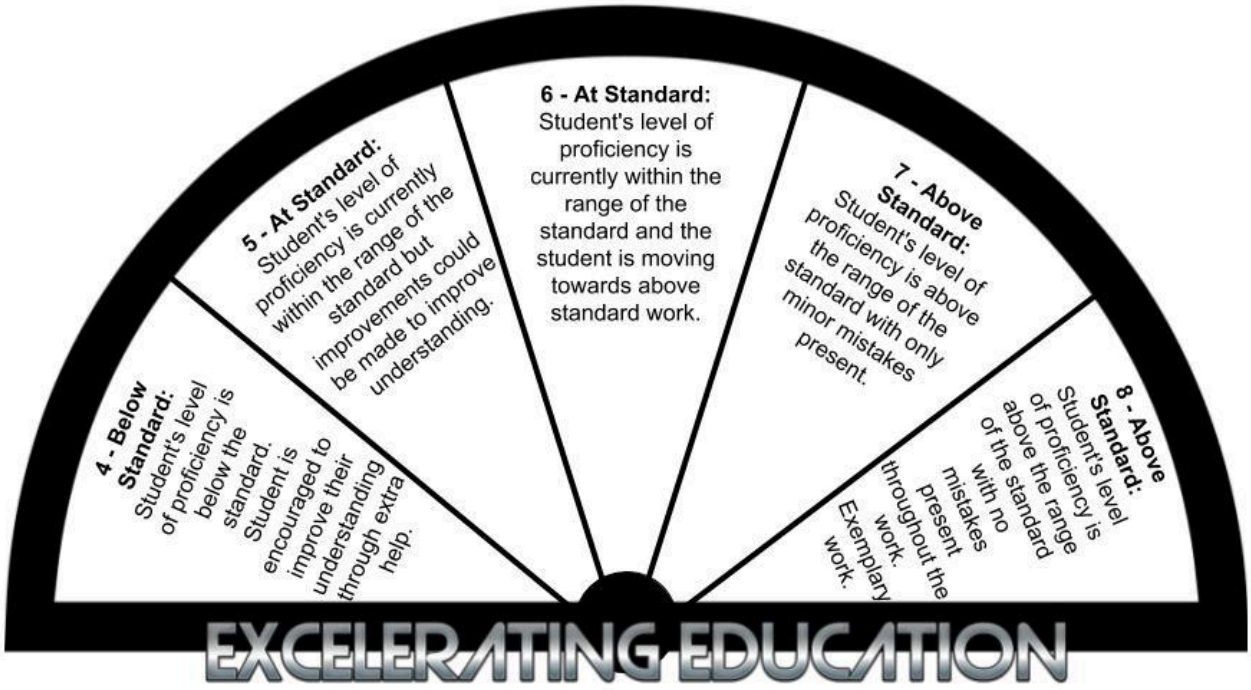
- ❏ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ❏ Introduce your weather instruments and talk about what what properties of weather your instruments measure and how your particular instruments measure these properties (i.e. a rain gauge measures centimeters of rain). Describe where you got your information from to design and build the tools you decided to build.
- ❏ Describe the design process for the tools.
- ❏ Describe the necessary tools, materials, and skills needed for the project
- ❏ Include Video footage and / or pictures of the building process
- ❏ Include Video footage and / or pictures of the testing process
- ❏ Answer these question in your communication: What importance do your instruments have with meteorology? Why do meteorologists use instruments such as the one you made.
- ❏ Describe how your three meteorological tools compare to the tools professionals use. Search for images of your three instruments on a search browser such as "Google" or "Bing" and compare and contrast your tools to "professional" tools.
- ❏ Describe your weather report for the three days you tested your weather instruments.
- ❏ Answer this question in your communication: Based upon your testing (all three days), are your instruments accurate? *How do you know? Use evidence from your testing to prove that your instruments are either accurate or inaccurate.*
- ❏ Describe any ways that your tools could be improved to be more accurate and conclude your communication.



Instructable Rubric

Did the communication include…

- ❏ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ❏ Introduce your weather instruments and talk about what what properties of weather your instruments measure and how your particular instruments measure these properties (i.e. a rain gauge measures centimeters of rain). Describe where you got your information from to design and build the tools you decided to build.
- ❏ Describe the design process for the tools.
- ❏ Describe the necessary tools, materials, and skills needed for the project
- ❏ Include Video footage and / or pictures of the building process
- ❏ Include Video footage and / or pictures of the testing process
- ❏ Answer these question in your communication: What importance do your instruments have with meteorology? Why do meteorologists use instruments such as the one you made.
- ❏ Describe how your three meteorological tools compare to the tools professionals use. Search for images of your three instruments on a search browser such as "Google" or "Bing" and compare and contrast your tools to "professional" tools.
- ❏ Describe your weather report for the three days you tested your weather instruments.
- ❏ Answer this question in your communication: Based upon your testing (all three days), are your instruments accurate? *How do you know? Use evidence from your testing to prove that your instruments are either accurate or inaccurate.*
- ❏ Describe any ways that your tools could be improved to be more accurate and conclude your communication.



Poster Rubric

Did the communication include…

- ❏ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ❏ Introduce your weather instruments and talk about what what properties of weather your instruments measure and how your particular instruments measure these properties (i.e. a rain gauge measures centimeters of rain). Describe where you got your information from to design and build the tools you decided to build.
- ❏ Describe the design process for the tools.
- ❏ Describe the necessary tools, materials, and skills needed for the project
- ❏ Include Video footage and / or pictures of the building process
- ❏ Include Video footage and / or pictures of the testing process
- ❏ Answer these question in your communication: What importance do your instruments have with meteorology? Why do meteorologists use instruments such as the one you made.
- ❏ Describe how your three meteorological tools compare to the tools professionals use. Search for images of your three instruments on a search browser such as "Google" or "Bing" and compare and contrast your tools to "professional" tools.
- ❏ Describe your weather report for the three days you tested your weather instruments.
- ❏ Answer this question in your communication: Based upon your testing (all three days), are your instruments accurate? *How do you know? Use evidence from your testing to prove that your instruments are either accurate or inaccurate.*
- ❏ Describe any ways that your tools could be improved to be more accurate and conclude your communication.