

WTEA BLANK TEMPLATE

Name: _____

Engineering Notebook

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DESIGN PROCESS STEP #1 Identify Problem/Set Goals

Problem: Real World Problem to Solve

Goals: Learning Objectives/Standards

★ Personal Goal: (Student written)

DESIGN PROCESS STEP #2 Research & Brainstorm (order may flip)

Brainstorm: Prompt to get them actively thinking, free flow, sketches, labels, diagrams, doodles all welcome - no erasing

Research: Teacher Provided Notes, Vocabulary, Diagrams, Room for Student Research, Data, etc

DESIGN PROCESS STEP #3 Design/Plan

Orthographic Drawings, Dimensions, Lists, Details, Materials, etc.

DESIGN PROCESS STEP #4 Build

Build: list directions, safety, protocols etc.

DESIGN PROCESS STEP #5 Test

Test: Put the idea into action and observe. Test should be systematic, changing one variable at a time, recording results. Charts, data tables, or spreadsheets could be used.

DESIGN PROCESS STEP #6 Evaluate

Evaluate: Observe carefully during the test and ask the 3 key questions:

1. What is working well with this design?
2. What's not working well with this design?
3. What else can I try to get even better results?

DESIGN PROCESS STEP #7 Redesign

Redesign: Whenever possible allow students to test, evaluate, & redesign as many times as possible, showing we learn and improve from our mistakes and mistakes of others

DESIGN PROCESS STEP #8 Communicate & Implement

Communicate: Share the idea with teacher for grading with the class, or with the world!

Implement: Put the idea into action, make it happen!

STEM 6 - Properties of Flight
Engineering Notebook

Name: _____

DESIGN PROCESS STEP #1 Identify Problem/Set Goals

Problem:

- ★ Design and build a paper airplane that will fly the farthest distance.

Goals:

- ★ Use effective teamwork.
- ★ Accurately measure the mass of your plane and distance it flies.
- ★ Use a spreadsheet to organize and analyze data.
- ★ Personal Goal:

DESIGN PROCESS STEP #2 Research & Brainstorm

Brainstorm: What design features do you think will make a paper airplane fly a far distance?

(Research pages here from Stem Academy STEM101 Middle School Curriculum)

DESIGN PROCESS STEP #3 Design/Plan

Find 2 different paper airplane designs you would like to test. Sketch or describe each design below, and record the source. You may build and test designs at home. For inspiration, you may use books, websites, or family members.

#1 Plane Name:

Source: _____

#2 Plane Name:

Source: _____

DESIGN PROCESS STEP #4 Build

Build: Build both airplanes using only the supplies provided.

- One sheet of 8 ½ x 11 inch white paper (per plane)
- Clear tape
- Paperclips (2 sizes, unlimited)

You may use my scissors and rulers.

You will not be able to start over with new paper.

Conserve materials and make it work even if things don't go as planned.

DESIGN PROCESS STEP #5 Test

Test: Test your airplanes in the hallway.

- Safety first.
- You may take paper clips out with you to test flying with and without them.
- Flying technique can be just as important as plane design. Try different methods and have both partners fly each plane.

DESIGN PROCESS STEP #6 & #7 Evaluate & Redesign

After each test, return to your table to discuss your results and record your observations and ideas below.

Remember only make one modification at a time to try and improve each plane's flight.

Test #	Plane 1:	Plane 2:
1	What worked well?	What worked well?
	What didn't work well?	What didn't work well?
	What else can we try?	What else can we try?
2	What worked well?	What worked well?
	What didn't work well?	What didn't work well?
	What else can we try?	What else can we try?
3	What worked well?	What worked well?
	What didn't work well?	What didn't work well?
	What else can we try?	What else can we try?

DESIGN PROCESS STEP #7 Redesign

Redesign: Based on our research, and your testing notes, choose a plane to compete with.

Circle your airplane choice: Airplane #1 Airplane #2

Describe any modifications you made to that plane's original design, or your flight technique to improve its flight.

DESIGN PROCESS STEP #8 Communicate & Implement

Communicate:

Use the balance to measure the mass of your plane:

Mass: _____

Add your mass to our classroom spreadsheet.

Implement:

Now it's time to fly your plane! Record the flight distance below and on the spreadsheet. We'll use the spreadsheet tools to analyze the data when all are finished!

Flight _____ feet _____ inches

Show your work to convert to total inches:

Flight _____ inches

4. List the four forces of Flight. (½ point each)

5. Pick one of those forces above and describe how that force was showing its effect during your competition flight. (2 points)

6. Describe an advantage of using a spreadsheet.

7. On a scale of 1 - 5 how effective of a team member were you?
 (circle one)

1	2	3	4	5
I did not follow any of the Effective Teamwork Guidelines any of the time.	I needed multiple reminders to follow the Effective Teamwork Guidelines.	I have some things I know I need to work on to follow the Effective Teamwork Guidelines.	I followed the Effective Teamwork Guidelines almost all of the time, but there's still room for improvement.	I followed all of the Effective Teamwork Guidelines all of the time perfectly.

Explain why you rated yourself as you did above.

8. On a scale of 1 - 5 how effective were your team members?
 (circle one)

1	2	3	4	5
They did not follow any of the Effective Teamwork Guidelines any of the time.	They needed multiple reminders to follow the Effective Teamwork Guidelines.	They have some things they are working on to follow the Effective Teamwork Guidelines.	They followed the Effective Teamwork Guidelines almost all of the time, but there's still room for improvement.	They followed all of the Effective Teamwork Guidelines all of the time perfectly.

Explain why you rated your team as you did above.

	3	2	1	0
Personal Goal				
Brainstorming				
Design Plan				
Test & Evaluate (You may want to separate.)				
Redesign				
(Unit specific)				
(Unit specific)				
(Unit specific)				
Teamwork				
Communication - Complete Sentences				
Reflection & Application				

One point will be earned for each question that was answered accurately, thoughtfully, and completely. (___ points total)

Total Points: _____ / _____ %

6th Grade Properties of Flight Summative Rubric

	3	2	1	0
Personal Goal Page 1	Personal goal written.			Personal goal incomplete or missing.
Brainstorming Page 1	Brainstorming section lists design feature ideas			Brainstorming section left blank.
Design Plan Page 5	2 different sketches completed. The source is listed for each.	1 sketch or source is missing or incomplete	2 sketches or sources are missing or incomplete.	Design Plan left blank.
Test Flights & Evaluate Page	Test flight session and questions were thoughtfully completed.	Test flight session and questions were completed, but answers are vague or limited.	One or more questions were left blank.	Questions were left blank OR team did not finish plane in time to test.
Redesign Page 6	Airplane Choice is marked. Modifications are described in detail.	Airplane Choice is marked. Modifications were written, but were limited or did not include detail.	Airplane choice or modifications left blank.	Airplane choice and modifications both left blank.
Communicate Page 6	Mass of plane accurately recorded.	Mass is recorded, but is not accurate.		Mass is left blank.
Competition Flight Page 6	Plane flown in competition. Flight distance accurately measured and recorded.	Plane was flown. Distance is recorded, but not accurately.	Distance left blank in packet.	Team members did not participate in competition.
Data Collection/ Spreadsheet	All data recorded in spreadsheet.	One area of data is missing from the spreadsheet.	More than one area of data is missing from the spreadsheet.	All data is missing from the spreadsheet.

Teamwork	Didn't take over, didn't sit out, made decisions and spoke respectfully, did equal share of work, & had packet in class each day.	Needed a reminder to follow the Effective Teamwork Strategies OR packet was missing in class one day.	Needed two reminders to follow the Effective Teamwork Strategies packet was missing multiple days.	Needed 3 or more reminders to follow the Effective Teamwork Strategies.
Communication - Complete Sentences	Reflection and App. questions & packet responses all include complete sentences, capitalization, & punctuation.	2-3 answers were not complete sentence or were missing capitalization or punctuation.	4-5 answers were not complete sentences or missing capitalization or punctuation.	5 or more answers were not complete sentences, were missing capitalization, or punctuation.
Reflection & Application		One point will be earned for each question that was answered accurately, thoughtfully, and completely. (10 points total)		

Total Points: _____ / 40

_____ %