AFDA 2019 Cumulative Project

In lieu of a Final Exam, we will be completing a cumulative experimental project to combine the skills we've learned throughout the year. Students will be required to work in groups of 4 (or 3 when circumstances dictate) to gather data, model relationships, analyze patterns, and present their findings. This project is designed to be completed during class time and will not require work time outside of class unless you are absent. The project counts as 10% of the overall course grade.

Experimental Goal: To determine the relationship between the number of apps running and the time it takes a cell phone to recharge.

Students must come to class on _____ with their cell phones nearly dead (<20%) and a charger. Students will be charging them during class as part of the experiment.

Project Outline:

Day 1: Collect data (in groups)

- make hypothesis
- gather data
- make observations

Day 2: Graph & Analyze (independently/ in groups)

- graph data
- lines of fit
- analyze mathematical relationships
- predict how long until fully charged
- compare graphs
- create a combined graph of all data sets

Day 3: Writing independent summary of combined graphs (independently)

- students will answer questions summarizing their findings
- make conclusions related to their original hypothesis

Day 4: Prepare presentations (in groups)

Day 5/6: Group presentations to the class

- All group members must contribute to the presentation

Student Presentations will be on _____.

Daily attendance is **critical** throughout the project. A student's absence may impact their project grade.

Grading: Student grades will be based on individually graded assignments as well as group products and presentation.

Graded Assignments:

- Data collection worksheet (independent work)
- Individual graphs (independent work)
- Data Analysis/regression worksheet (independent work)
- Combined graph (group product)
- Independent summary worksheet (independent work)
- Group presentation to the class (group product)

The project counts as 10% of the overall course grade and will NOT be averaged into the 4th marking period.

Name: _____ **Block**: _____**Date**: _____

AFDA Cumulative Project Data Collection

The members of my group are: _____

The number of apps I have open are _____. My starting charge percentage is _____.

Hypothesis: How long do you think that it will take your phone to charge to 100% based on how many apps you are using and how much your phone needs to charge? How do you think your model of phone will affect the charging speed? Explain why you think this. (2-3 sentences)

_____

_____

_____

_____

_____

Put your data in this table as you collect it.

Data point	Time Elapsed	Percentage	Apps Running
#0			
#1			
#2			
#3			
#4			
#5			
#6			

Data Point	Time Elapsed	Percentage	Apps Running
#7			
#8			
#9			
#10			
#11			
#12			
#13			

Based on the data that you collected, how long do you think that it would take your phone to charge completely, if it is not already at 100%? (2-3 sentences)

_____

_____

_____

_____

_____

How do you think the number of apps you used affected your data? What observations can you make looking at your data? (2-3 sentences)

_____

_____

_____

_____

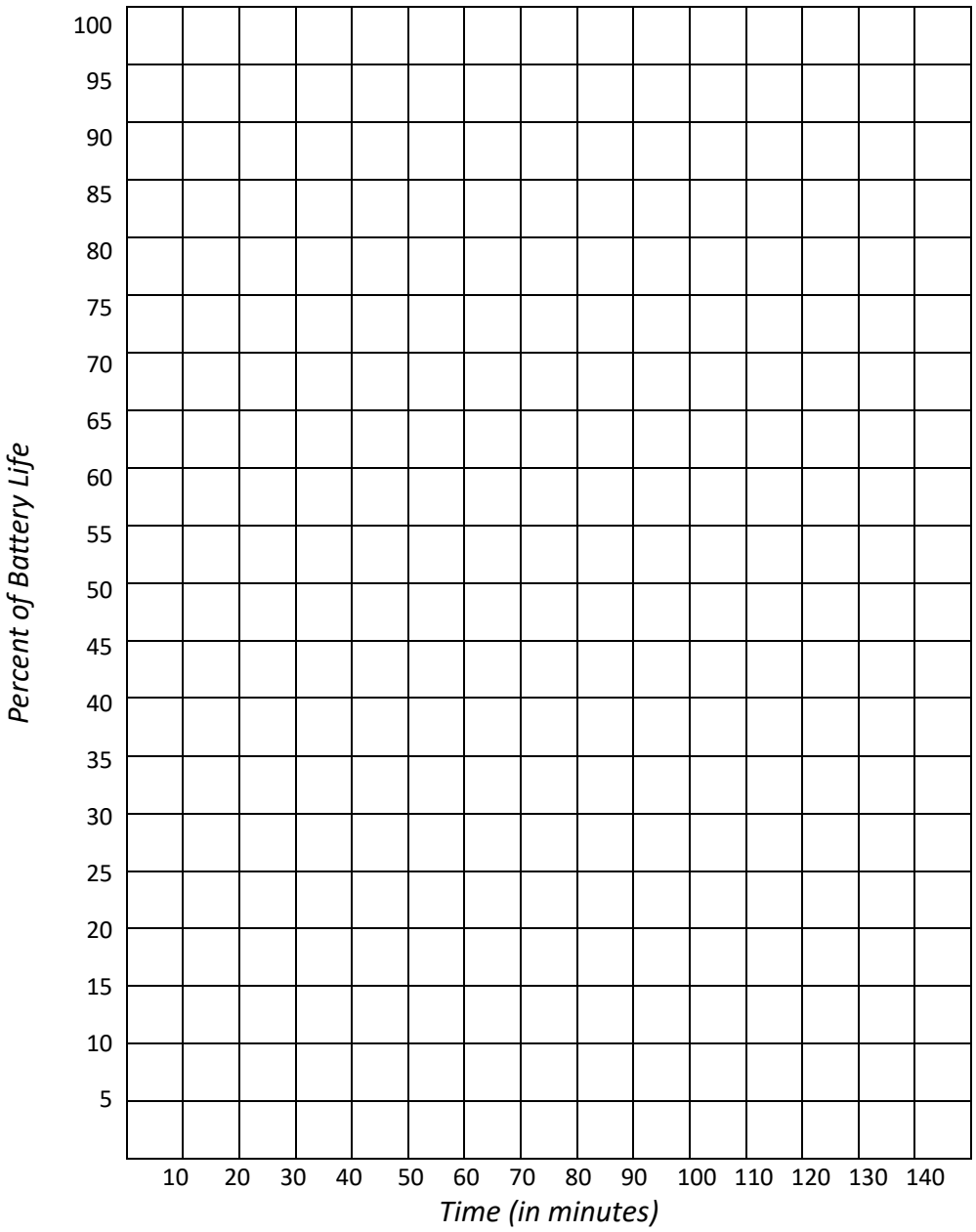
_____

Name: _____ **Block**: _____**Date**: _____

AFDA Cumulative Project Data Analysis

1. Graph your data.

Graph Title: Battery Charge with _____ Apps running



2. Would you describe the data's shape as most closely resembling a linear, quadratic, or exponential regression? _____

Why? _____

_____

<continued on back>

For 3 – 8, round all values to three decimal places.

3. Using your collected data and a graphing calculator, find the **linear** regression equation. _____

4. What is the **linear** regression correlation value. _____

5. Using your collected data and a graphing calculator, find the **quadratic** regression equation. _____

6. What is the **quadratic** regression correlation value. _____

7. Using your collected data and a graphing calculator, find the **exponential** regression equation. _____

8. What is the **exponential** regression correlation value. _____

9. Based on the regression correlation values, which regression equation (*linear, quadratic,* or *exponential*) is most appropriate? _____

Explain your reasoning. _____

_____

_____

10. Using the regression type you identified in question 9, use the regression equation to predict what the charge would be after charging for 50 minutes. *Round to the nearest whole percent.* _____

11. Using your regression equation, predict how long it would take to reach a full charge. *Round to the nearest minute.* _____

Name: _____ **Block**: _____**Date**: _____

AFDA Cumulative Project Independent Summary

Did the data you collected support your original hypothesis? Explain.

_____

_____

_____

_____

_____

_____

How did your initial observations relate to your hypothesis? How did they relate to your conclusions?

_____

_____

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How does your data compare with the other members of your group? Do you notice any patterns or abnormalities?

_____

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_____

_____

_____

What inferences can you draw from the data?

_____

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_____

What, if any, human errors could be included in our data? How could these be prevented?

_____

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_____

_____

Where can this research take us? What further studies can be done? How can this be applied to practical scenarios?

_____

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_____

_____

AFDA Cumulative Project – Grading Rubrics

Part 1: Data Collection worksheet Name _____

Criteria	**Scoring: _____ / 13 = _____ %**		
Identified initial start data		Yes – 1	No – 0
Hypothesis			
– prediction made		Yes – 1	No – 0
– reason provided		Yes – 1	No – 0
– reasoning is logical		Yes – 1	No – 0
– clearly communicated		Yes – 1	No – 0
Student participated in data collection	Yes, Actively – 2	Yes, Inactively – 1	No – 0
Data Collection Reflection			
– prediction based on data	Yes, reasonable 2	Yes, unreasonable 1	No 0
– How # of Apps affected data	Yes, reasonable 2	Yes, unreasonable 1	No 0
– What observations…	Yes, thorough 2	Yes, basic 1	No 0

Part 2: Data Plot & Analysis worksheet

Criteria – Data Plot	**Scoring: _____ / 5 = _____ %**		
Graph			
– completed title		Yes – 1	No – 0
– points are accurately plotted		Yes – 1	No – 0
– graph is neat		Yes – 1	No – 0
ID Graph Shape (# 2)	Yes, Appropriate 2	Yes, Inappropriate 1	No 0

Criteria – Regression Analysis	**Scoring: _____ / 6 = _____ %**		
Data Regressions			
– regression equations are reasonable (correct forms) (#s 3 – 8)	Yes, reasonable 2	Partial – missing "y =" 1	No 0
– Best Regression equation (# 9)	Yes, reasonable 2		No 0
– Calculations	Yes, reasonable 2	Yes, but with errors 1	No 0

Part 3: Group Graph

Criteria	**Scoring: _____ / 16 = _____ %**		
Graph			
– title	Yes, appropriate – 2	Yes, too general – 1	No – 0
– key	Yes, detailed – 2	Yes, incomplete – 1	No – 0
– scale labeled	Yes, both – 2	Yes, only one – 1	No – 0
– axis titles	Yes, both – 2	Yes, only one – 2	No – 0
– Data points for all members	Yes, all – 4	Some – 2	
– Lines of Best fit are sketched	Yes, all – 4	Some – 2	

Part 4: Independent Summary worksheet

Criteria	**Scoring: _____ / 21 = _____ %**			
#1: Did data support hypothesis? Explain.	Yes or No Explanation is appropriate 3	Yes or No Explanation doesn't make sense 2	Yes or No No explanation 1	Blank 0
#2: How did your … – Observations relate to hypothesis – Observations relate to conclusion	Addressed both in detail 3	Addressed both superficially 2	Only addressed one 1	Blank 0
#3: Data comparisons with group	Identified with detail 3		Identified only 1	Blank 0
#4: Inferences	Thorough, well written 3	Basic, well written 2	Basic, poorly written 1	Blank 0
#5: Regression reasoning	Identified w appropriate reasoning 3	Identified but inappropriate reason 2	Identified only 1	Blank 0
#6: Human errors – what human errors could've occurred – How could they be prevented	Addressed both in detail 3	Addressed both superficially 2	Only addressed one 1	Blank 0
#7: Thinking ahead … – further studies? – applications?	Addressed both in detail 3	Addressed both superficially 2	Only addressed one 1	Blank 0

Cumulative Project Grade Summary Name _____

Part 1: Data Collection _____ / 13 = _____%

Part 2: Data Plot & Analysis _____ / 11 = _____%

Part 3: Group Graph _____ / 16 = _____%

Part 4: Independent Summary _____ / 21 = _____%

Part 5: Group Presentation _____ / 20 = _____%

Names: _____

AFDA Cumulative Project Presentation Rubric

Category	Exceeds Expectations 4 Points	Meets Expectations 3 Points	Did Not Meet Expectations 1 Point	Not Completed 0 Points	Score
Length	The presentation was 2-5 minutes in length. Time was used effectively and presentation flowed smoothly with no breaks.	The presentation was 2-5 minutes in length. Time was used effectively with few breaks.	The presentation was shorter or longer than 2-5 minutes. Time was not used effectively with many breaks.	Presentation not done.	
Organization	Materials are organized and neat. Presentation format is appealing and easy to follow.	Materials are organized and neat. Presentation format fits requirements.	Materials are not organized and/or neat. Presentation format is hard to follow.	Presentation not submitted.	
Data	All data is complete and matches work done on the project. Data is analyzed with little to no assistance. Findings are accurate and elaborate.	All data is complete and matches work done on the project. Data is analyzed with assistance. Findings have 2 errors or less.	Data is not complete or does not completely match work done on the project. Data is not fully analyzed or there are many errors.	Data does not match work done. Data is not analyzed.	
Clarity	All ideas are expressed clearly with an obvious understanding of the findings.	Ideas are mostly clear with little missing information. Findings are clearly stated.	Ideas are hard to follow and the findings are not clearly stated.	No clarity of ideas or findings.	
Present (Individually Scored)	All members of the group participate in the presentation, and everyone has a role that represents an equal share of the responsibility.	All members of the group participated in the presentation. Some members do more work than others.	Members of the group were missing during the presentation. Not all members participated.	No presentation given.	
				Total Points	/20

Comments: _____

_____

_____