Unit 1.1 Exam Introduction to Design Study Guide V3

Use only the conversions found on the official PLTW engineering formula sheet

1. What are the parts of a Design Brief? What goes in each section?
2. What are the steps of the Design Process? What happens in each step?
3. List four techniques to encourage more unique ideas.
4. Draw and label the typical decision matrix. How do you use a decision matrix to choose the "best" idea?
5. Billy Brahma produces a plant-based substitute meat product called the "I Can't Believe It's Not Steak" steak. He has hired you to work in the factory to ensure that their steak forming machines are making the right sized steaks. You decide to take a 12-steak sample from the 1st manufacturing line.

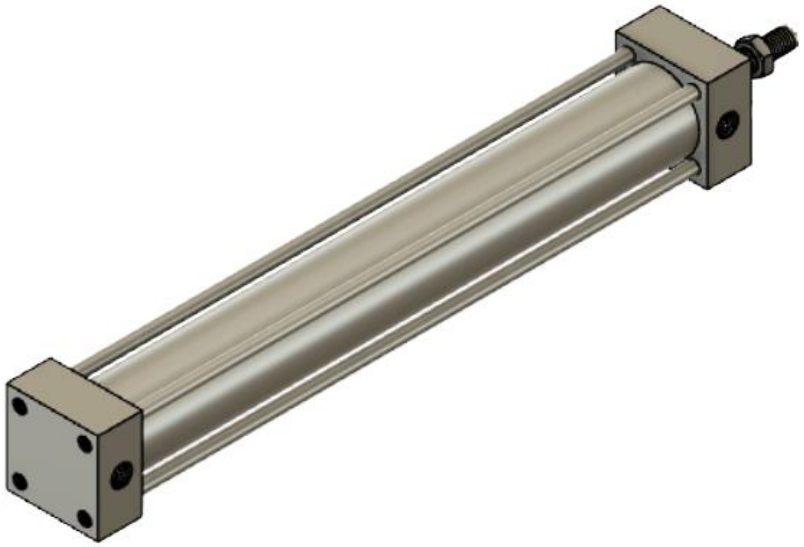
Write each digit of your STUDENT ID in their own box below:					
A	**B**	**C**	**D**	**E**	**F**

Substitute the digits of your STUDENT ID with the corresponding letter when you see it in the chart below. For example if your STUDENT ID number is 305734, and you see 26.A in the chart below, then the number is 26.3 since 3 corresponds to A. Likewise, if you see 5F.5, then the number is 54.5 since 4 corresponds to F. You'll then have 12 data points for weight for the calculations in #4.

Sample #		Weight (oz)	Sample #		Weight (oz)
1	26.**A**		7	3A.**1**	
2	26.**B**		8	3B.**3**	
3	28.**C**		9	3C.**1**	
4	28.**D**		10	3D.**5**	
5	29.**E**		11	4E.**7**	
6	29.**F**		12	5F.**5**	

6. Calculate the mean, median, mode and range of these 12 steak samples. Make sure you round properly.
7. Determine the 5 number summary for these 12 steak samples.

8. Determine if there are any outliers using a calculation. Explain why they are outliers.
9. Use Google Sheets to create a box plot. Determine if the plot is skewed. What sizes of steaks would you predict the next steak that comes out to be? Explain how you can make that prediction.
10. As an engineer, in light of all of your calculations, what do you need to do to the steak forming machine if it is supposed to make 29.5 oz steaks? Discuss the accuracy of your machine if you wanted the average steak produced to have an error less than 5 oz? Discuss the precision of your machine if you wanted all steaks to be plus/minus 25% of the target weight?
11. Since part of your engineering team works in Xiamen, China, you need to convert your findings to the metric system. Convert your mean of the 12 sample data set to kilograms.
12. If the steak forming machine can produce 451 ounces of "meat" per hour, how many steaks can it produce in a month? Assume that the month has 30 days and that the machine is supposed to make 29.5 oz steaks. You must use dimensional analysis to figure out the answer. Show your work.
13. During the last Zoom call, your team in Xiamen was confused about a certain part of the steak forming machine. Somehow the meat extruder nozzle got translated into 喙形肉, which means "beak-forming meat." In order to clear things up, you decide to send them an orthographic drawing of the front view of the part.



Draw the front view of the part in the space below and explain why this is the best front view. Make sure you start with "the box."