

Task: Rings
10th grade- Algebra 2

Describe the context of your task here. Separate the parts of the task into A, B, C, etc.

The following task would be best fitted in the Algebra 2 curriculum. Based on the new common core standards, this will be located in the probability and statistics category.

Students will start on the task on an individual basis. The task will involve the use of finding the correct measurement of an object and the tolerance. For this task, students will apply the normal distribution curve to the object and use his or her knowledge of standard deviations to complete the problem.

Prior knowledge students should have: Normal distribution curve (bell curve), standard deviation, and understanding tolerances

Part A: Students will have private think time to create the normal distribution based on the information provided.

Part B: Students will compare with 1 other student to ensure the normal distribution curve is completed and correct. Students will provide hints and/or corrections during this time. This step is important, because if the curve is incomplete or wrong in any fashion, he or she could not answer the following questions correctly.

Part C: Students will go back to private think time and answer the following questions based on the situation. The questions will include real life application and students must use problem solving to complete the task.

Part D: Students will be put in a group of 3 to talk about each of his or her solution(s) to the task. At the end of the activity, students will be required to write a reflection on how the group's answer(s) was different than that of their own and how the group resolved to find the best answer.

Common Core State Standards

List the Common Core State Standards (and math practices if applicable) associated with your task.

CCSS.MATH.CONTENT.HSS.ID.A.4

Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.

CCSS.MATH.PRACTICE.MP4 Model with mathematics.

CCSS.MATH.PRACTICE.MP6 Attend to precision.

Essential Understandings

What key insights should students take from participating in this task?

The real world application use of a normal distribution graph in a factory setting.

The use of normal distribution graph in a real world example.

How the tolerance of a ring can impact the use of the part.

Possible Solutions/Solution Paths

Creating the correct normal distribution graph. This includes percentages, measurements of the pieces, and number of pieces that are made correctly. The solution path very direct, but the understanding on how the factories use the normal distribution graph in its business is the main point.

Additional Teacher Information

The use of the term tolerance is a manufacturing term. The teacher will have to do additional practice and explanation before this activity is used. This requires the real world use of factory work.

Measuring and Approximating Pistons

Background Information: You and your friend are at a factory, which produces pistons. The piston ring is approximately .005 inches. The standard deviation of the piston ring is .0015 inches.

Piston Information: If ringside clearance is too large, the ring will tip excessively, reducing its ability to seal. Excess movement of a piston ring may also cause it to break. If clearance is too small, the ring may bind in its groove when the **piston** heats up and expands.

Task 1: On your own, create a normal distribution chart representing the background information.

- A. If there are 2000 piston rings, what is the minimum and maximum length of a ring within 1 standard deviation?
- B. How many piston rings will be created within two standard deviations of the mean?
- C. For the company to be able to ship the ring, the ring must be within tolerance. The tolerance of the ring is +. 00075 inches and - .00075 inches. What percentage of the rings will be within tolerance based on the previous data?
- D. A manufacturer makes a ring out of tolerance. Create two examples of what the ring could be if it is out of tolerance. Explain what impact the ring will have on the piston in each case.

Group Reflection: Similarities and Differences