Is a Normal Model Reasonable?

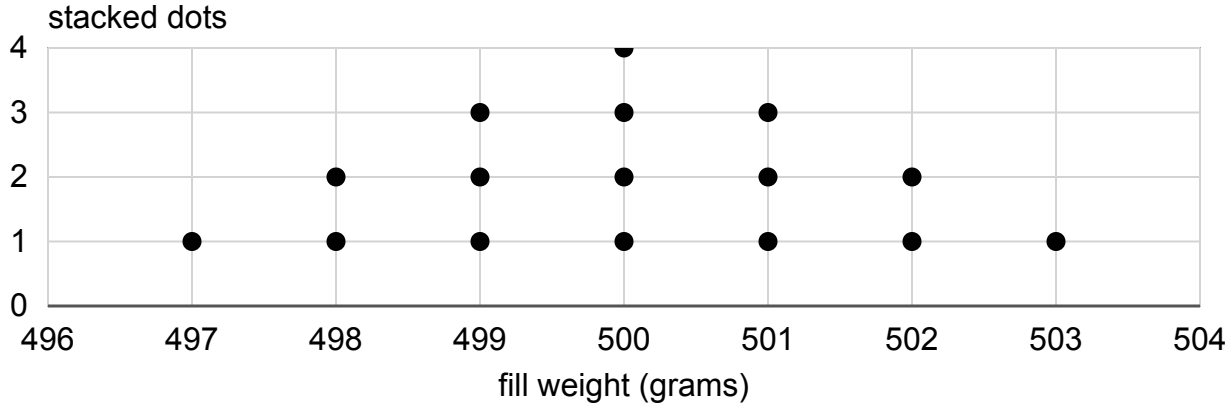
Use shape and context to judge whether a normal model is suitable

Name: _____ Date: _____

Part A - Package Fill Weights

Normal-model check: A normal model can be a useful approximation when data form one roughly symmetric mound with no important gaps or extreme values. Context matters too: a model is a tool, not proof that data are normal.

Fictional classroom simulation data. A quality team randomly checked the fill weight of 16 snack packages. Each dot is one package; weights are recorded to the nearest gram.



1. Is a normal model reasonable for these fill weights? Choose one: **reasonable** / **not reasonable** / **need more information**.

Explain using the shape of the dots and the fact that fill weight is a measurement. Do not say the graph proves the data are normal.

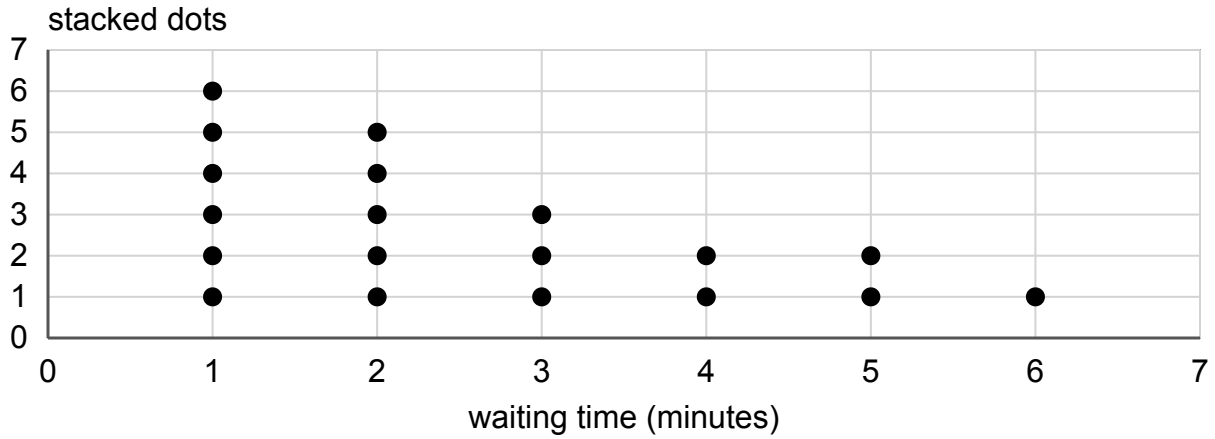
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Part B - Lunch-Line Waiting Times

Fictional classroom simulation data. Nineteen students recorded how long they waited in a lunch line. Each dot is one student. Times were rounded to the nearest minute.



2. Is a normal model reasonable for these waiting times? Choose one: **reasonable** / **not reasonable** / **need more information**.

Describe the shape. Then connect your decision to waiting time: why might a lower boundary of 0 minutes matter?

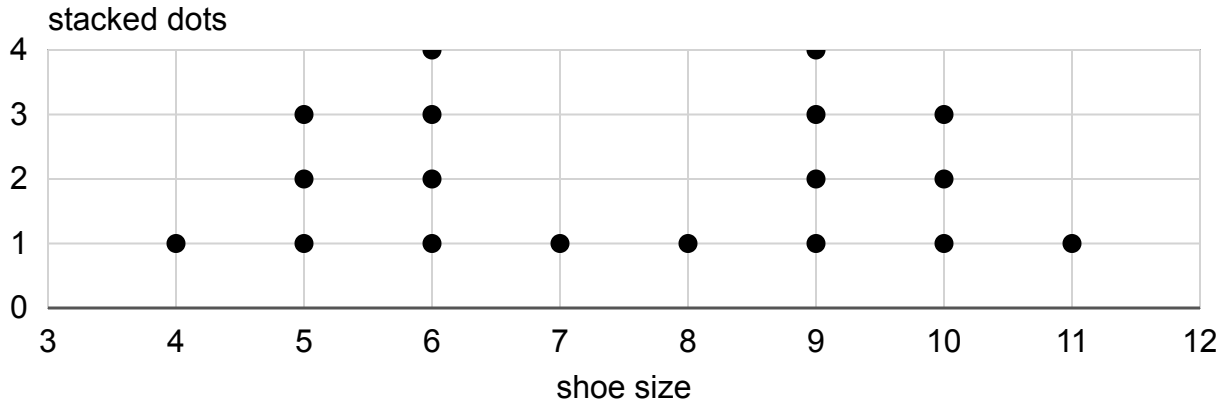
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Part C - Shoe Sizes in a Combined Group

Fictional classroom simulation data. A store combined shoe-size records from two different youth sports teams. Each dot is one shopper; shoe sizes are whole-number categories.



3. Is one normal model reasonable for the combined group? Choose one: **reasonable** / **not reasonable** / **need more information**. Explain the two peaks and the combined-group context.

4. Of A, B, and C, which display is the best candidate for a normal model? Write its letter and one reason based on both shape and context.

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Answer Key and Teaching Notes

Materials and setup: Print and supply all student pages, keeping teacher-key pages separate. Supplied: three fictional dot plots and response lines. Additionally needed: pencils and, optionally, a document camera. Students work independently first, then compare reasoning with a partner.

Teacher-read script: “Today you are judging whether a normal model would be useful, not proving that any data set is normal. Look for one roughly symmetric mound, but also ask what was measured and how the data were collected. A symmetric-looking display alone is not enough.”

Observation method: While students write, note whether each student (1) identifies a relevant shape feature and (2) names a relevant context feature. Confer by asking, “What feature of the display supports your decision?” and “What feature of the situation matters?” Do not require identical wording.

1. Package fill weights: Reasonable. The dots make one roughly symmetric, unimodal mound centered near 500 grams, with no pronounced gaps or isolated values. Fill weight is a quantitative measurement from a production process, so a normal model could be a useful approximation. Accept “need more information” only when the student correctly notes that 16 observations are limited and explains what more information would help. The display does not prove normality.

2. Lunch-line waiting times: Not reasonable. The distribution is right-skewed: many waits are short, with a tail toward longer waits. Waiting time cannot fall below 0, and a few delays can make long waits. A normal model would not match this shape well. Accept a well-supported “need more information” if the student still identifies the skew and boundary concern.

3. Combined shoe sizes: Not reasonable for one normal model. The display is bimodal, with peaks near sizes 6 and 9, rather than one mound. Combining records from two teams may have mixed groups with different typical sizes. Separate group displays could be investigated, but the evidence given does not guarantee that either separate distribution is normal.

4. Best candidate: A. It has the closest match to a single, roughly symmetric mound and represents a measured quantity. Full-credit response includes both a shape reason and a context reason.

Quick rubric: For each item, award credit when the student makes a defensible suitability judgment and supports it with shape plus context. Do not award full credit for “it is symmetric” alone. Sample wording is not required.

Source note: All student data sets are original fictional classroom simulations created for this worksheet; no outside data source is being evaluated.