

LESSON
6.3

Investigating Algebra Activity: Explore a Normal Curve

For use before the lesson "Use Normal Distributions"

Materials: graph paper, salt, spray paint, newspaper, and music stand

QUESTION What is the percent of the area under a normal curve within 1, 2, and 3 standard deviations of the mean?

One type of probability distribution is a *normal distribution*. A *normal distribution* is modeled by a bell-shaped curve called a *normal curve* that is symmetric about the mean.

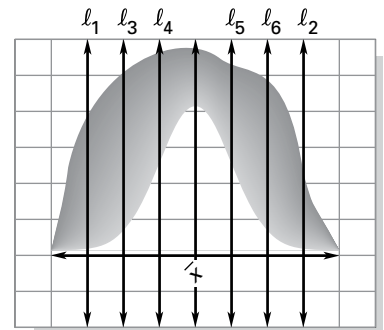
EXPLORE Create a normal curve

STEP 1 Cover the music stand with newspaper. Place a piece of graph paper on the stand. Tilt the stand to the desired angle, and pour salt from a point near the middle of the graph paper until enough salt has accumulated to make a bell-shaped curve. Spray the grid and salt with the paint. Discard the salt.

STEP 2 Once the paint has dried, approximate and record the area under the curve by counting the squares and portions of squares on the graph paper.

STEP 3 The mean is the value corresponding to the highest point of the curve. Draw a vertical line at the approximate mean.

STEP 4 Draw vertical lines l_1 and l_2 at the ends of the curve. Lines l_1 and l_2 represent 3 standard deviations to the right and the left of the mean. Approximate and record the area under the curve that is within 3 standard deviations of the mean.



STEP 5 Draw two equally spaced vertical lines l_3 and l_4 between the mean and l_1 . Draw two equally spaced vertical lines l_5 and l_6 between the mean and l_2 . Lines l_4 and l_5 represent 1 standard deviation from the mean. Lines l_3 and l_6 represent 2 standard deviations from the mean. Approximate and record the area under the curve that is within 1 and 2 standard deviations of the mean.

DRAW
CONCLUSIONS

Use your observations above to complete the following.

- Calculate the percent of the area under the normal curve that is within 1, 2, and 3 standard deviations of the mean. (*Hint:* To calculate the area under the normal curve that is within 1 standard deviation of the mean, divide the area under the normal curve within 1 standard deviation of the mean by the total area under the curve.)
- Compare your answers with your classmates, and then write a rule describing the percent of the area under a normal curve that is within 1, 2, and 3 standard deviations of the mean.