11-10 Reteaching
Normal Distributions

If a data set has a *normal distribution*:

- 2.35% of the values will be between 2 and 3 standard deviations below the mean.
- 13.5% of the values will be between 1 and 2 standard deviations below the mean.
- 34% of the values will be within 1 standard deviation below the mean.
- 34% of the values will be within 1 standard deviation above the mean.
- 13.5% of the values will be between 1 and 2 standard deviations above the mean.
- 2.35% of the values will be between 2 and 3 standard deviations above the mean.

The graph of a normal distribution is a *normal curve*.

- A normal curve is shaped like a bell, with the highest point at the mean and tapering down evenly on either side of the bell.

Problem

The weight in pounds of newborn calves on a farm is distributed normally, with a mean of 85 and a standard deviation of 4. What percent of newborn calves on the farm weigh between 77 lb and 89 lb?

Step 1 Draw a normal curve. Label the mean.

Step 2 Divide the graph into 6 equal sections. Each section should be one standard deviation wide, which is 4 lb in this problem. Label each section with the appropriate percent for a normal distribution.
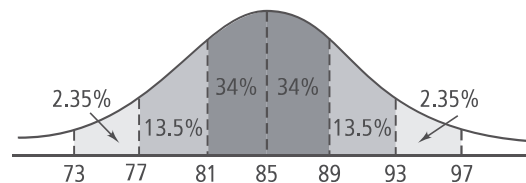
Step 3 Add the percents for the sections with weights 77 lb–81 lb, 81 lb–85 lb, and 85 lb–89 lb.
$13.5 + 34 + 34 = 81.5$

About 82% of newborn calves will weigh 77 lb–89 lb.

Exercises

Use the graph above to find the percent of calf weights within each interval.

1. from 73 lb to 81 lb **about 16%**

2. greater than 81 lb **about 84%**

3. from 77 lb to 97 lb **about 97%**

4. less than 85 lb **about 50%**

5. at most 89 lb **about 84%**

6. at least 93 lb **about 2.5%**

11-10 Reteaching (continued)
Normal Distributions

You can use the percents associated with a normal distribution to make predictions.

Problem

The number of hours a certain type of battery will last is distributed normally with a mean of 500. The standard deviation is 50. Out of 250 batteries tested, how many batteries would you expect to be still working after 550 h?

Step 1 Represent the normal distribution on a number line.

	2.35%	13.5%	34%	34%	13.5%	2.35%	

350   400   450   500   550   600   650

Step 2 Find the percent of batteries that last 550 h or longer. Which sections of the distribution contain values of 550 or greater? $13.5 + 2.35 = 15.85 \approx 16\%$

Step 3 Find 16% of 250 batteries. $x = 16(0.01)(250)$
$x = 40$

You can expect about 40 of the 250 batteries to be still working after 550 h.

Exercises

Sketch the normal distribution for the following data. Make a prediction based on your sketch.

7. A certain type of light bulb lasts an average of 219 h. Out of 1000 bulbs, how many would you expect to last less than 79 h if the standard deviation is 70 h?
about 24 bulbs

2.35% 13.5% 34% 34% 13.5% 2.35%

9   79   149   219   289   359   429
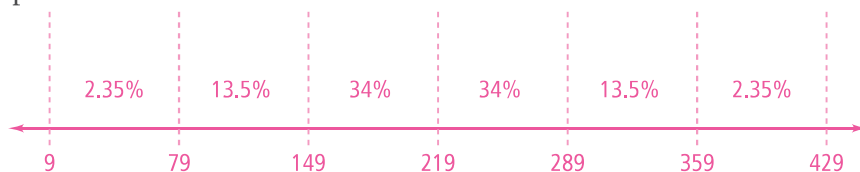
8. The 26 students in a math class can finish 100 problems in a mean time of 4 min. The standard deviation is 1 min. How many students in the class will still be working after 5 min?
about 4 students

2.35% 13.5% 34% 34% 13.5% 2.35%

1   2   3   4   5   6   7
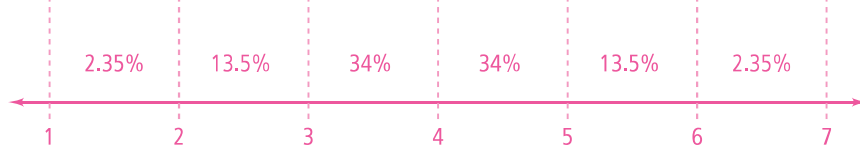
9. A group of 71 frogs hops a mean distance of 66 in. with a standard deviation of 3 in. How many frogs would you expect to hop more than 72 in.? **about 2 frogs**

2.35% 13.5% 34% 34% 13.5% 2.35%

57   60   63   66   69   72   75