

12.3 Types of Distribution (Evens)

Form G

Standard Deviation

Find the mean, variance, standard deviation, and median. Then identify the distribution.

- 232 254 264 274 287 298 312 342 398
- 26 27 28 28 28 29 30 30 32 35 35 36
- 2.2 2.2 2.3 2.4 2.4 2.4 2.5 2.5 2.5 2.6
- 75 73 77 79 79 74 81 74 70 68 70 72

Graphing Calculator Find the mean and the standard deviation.

5. price of XYZ Company stock for the first 12 weeks of 2006

| | | | | | |
|------|------|------|------|------|------|
| 5.34 | 5.40 | 5.41 | 5.42 | 5.50 | 5.55 |
| 5.55 | 5.57 | 5.70 | 5.65 | 5.66 | 5.68 |

6. price of XYZ Company stock for the first 12 weeks of 2009

| | | | | | |
|------|------|------|------|------|------|
| 6.00 | 5.95 | 5.92 | 5.80 | 5.81 | 5.75 |
| 5.75 | 5.75 | 5.64 | 5.52 | 5.40 | 5.03 |

Determine the number of standard deviations that includes all data values.

- The hours students in your study group study is 66.1 min; the standard deviation is 2.9 min.
62 63 65 64 64 68 68 69 72 66
- The mean weight of your pets is 18.25 lb; the standard deviation is 30.1 lb.
0.25 0.25 6 8 10 85
- Use the data for average daily water usage of a family during the past 10 months. Find the mean and the standard deviation of the data. How many items in the data set fall within one standard deviation of the mean? Within two standard deviations?
124 gal 113 gal 152 gal 545 gal 150 gal
490 gal 442 gal 207 gal 124 gal 147 gal
- Reasoning** In Lesson 11-5 an outlier is defined as a value "substantially different from the rest of the data in a set." How could you use the concept of standard deviation to rewrite this definition?

Practice (continued)

Form G

Standard Deviation

Find the standard deviation for each data set. Use the standard deviations to compare each pair of data sets.

11. prices of the first 10 cars sold at Joe's Used Car Lot in 1998:

\$900 \$1300 \$1200 \$850 \$800 \$1250 \$795 \$950 \$1020 \$975

prices of the first 10 cars sold at Joe's Used Car Lot in 2008:

\$2500 \$2700 \$3600 \$5000 \$1900 \$6175 \$4000 \$7200 \$9250 \$3000

12. times of boys in 100-m dash state high-school finals in 1998:

10.43 10.48 10.49 10.51 10.61 10.63 10.66 10.92

times of boys in 100-m dash state high-school finals in 2008:

10.32 10.38 10.39 10.48 10.70 10.74 10.83 10.90

Use the chart at the right for Exercises 13–17.

13. Find the mean amount of money raised for each year.

14. Find the standard deviation for each year.

15. **Writing** Use the standard deviation for each year to describe how school fundraising varied from 2006–2007 to 2007–2008.

16. For 2007–2008, the amounts raised by which clubs are not within one standard deviation of the mean?

17. **Error Analysis** A student says that the amounts raised in 2006–2007 by the Drama Club, Service Club, and Spirit Club are not within one standard deviation of the mean. Do you agree? Explain.

Fundraising at Smithburg High School

| Club | 2006–2007 | 2007–2008 |
|-----------|-----------|-----------|
| Adventure | \$500 | \$600 |
| Car | \$250 | \$250 |
| Chess | \$100 | \$120 |
| Drama | \$1500 | \$1400 |
| Ecology | \$475 | \$300 |
| Film | \$150 | \$250 |
| Service | \$2200 | \$4500 |
| Spirit | \$1000 | \$1500 |

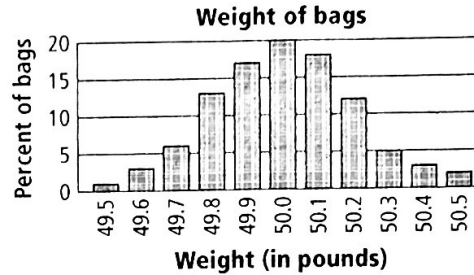
18. *What does having a large standard deviation tell you about your data? What about a small standard deviation?*

Practice

Form G

Normal Distributions

The actual weights of bags of pet food are normally distributed about the mean. Use the graph at the right for Exercises 1–4.



- About what percent of bags of pet food weigh 49.9 lb–50.1 lb?
- About what percent of bags weigh less than 49.8 lb?
- In a group of 250 bags, how many would you expect to weigh more than 50.4 lb?
- The mean of the data is 50, and the standard deviation is 0.2. Approximately what percent of bags are within one standard deviation of the mean weight?

Sketch a normal curve for each distribution. Label the x -axis values at one, two, and three standard deviations from the mean.

- mean = 95; standard deviation = 12
- mean = 100; standard deviation = 15
- mean = 60; standard deviation = 6
- mean = 23.8; standard deviation = 5.2

A set of data has a normal distribution with a mean of 5.1 and a standard deviation of 0.9. Find the percent of data within each interval.

- from 4.2 to 5.1
- from 6.0 to 6.9
- greater than 6.9
- The number of miles on a car when a certain part fails is normally distributed, with a mean of 60,000 and a standard deviation of 5000.
 - Sketch the normal curve for the distribution. Label the x -axis values at one, two, and three standard deviations from the mean.
 - What is the probability that the part will NOT fail between 55,000 and 65,000 miles?

Practice (continued)

Form G

Normal Distributions

13. Writing The list shows the number of siblings for each person in a class:

2, 2, 4, 2, 0, 2, 5, 2, 2, 1, 0, 2

Does the number of siblings appear close to being distributed normally? Explain.

14. Open-Ended On a math test the mean score is 82 with a standard deviation of 3. A passing score is 70 or greater. Choose a passing score that you would consider to be an outlier. Justify your choice.

15. A college only accepts students who score in the top 16% on the entrance exam. The exam scores are normally distributed, with a mean of 25 and a standard deviation of 3.8. To the nearest whole number, what is the least score you could earn and still be accepted to the college?

A normal distribution has a mean of 50 and a standard deviation of 6. Find the probability that a value selected at random is in the given interval.

16. from 44 to 50

17. from 38 to 56

18. from 50 to 62

19. at least 50

20. at most 56

21. at least 38

22. The table at the right shows the heights of sunflowers planted at the same time in a garden.

- a. Draw a histogram to represent the data.
- b. Does the histogram approximate a normal curve? Explain.

| Height (in.) | Frequency |
|--------------|-----------|
| 56 | 3 |
| 57 | 2 |
| 58 | 2 |
| 59 | 6 |
| 60 | 3 |
| 61 | 4 |
| 62 | 5 |
| 63 | 5 |
| 64 | 3 |

23. Reasoning In a set of data, the value 591 is 2 standard deviations from the mean and the value 462 is 1 standard deviation from the mean. Name two possible values for the mean. Justify your answers.