

2-4.0

Practice

The Normal Distribution

Determine whether the data in each table appear to be *positively skewed*, *negatively skewed*, or *normally distributed*.

1. Time Spent at a Museum Exhibit

Minutes	Frequency
0-25	27
26-50	46
51-75	89
75-100	57
100+	24

Normally distributed

2. Average Age of High School Principals

Age in Years	Number
31-35	3
36-40	8
41-45	15
46-50	32
51-55	40
56-60	38
60+	4

Negatively Skewed

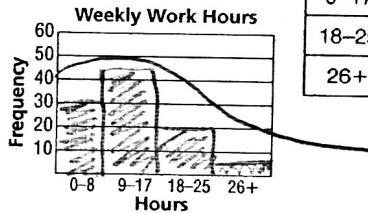
For Exercises 3 and 4, use the frequency table that shows the number of hours worked per week by 100 high school seniors.

3. Make a histogram of the data.

4. Do the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*? Explain.

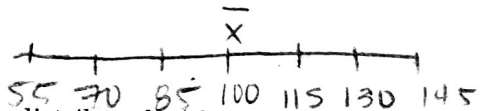
Positively skewed

Hours	Number of Students
0-8	30
9-17	45
18-25	20
26+	5



TESTING For Exercises 5-10, use the following information.

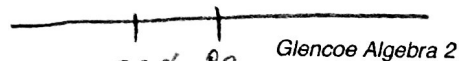
The scores on a test administered to prospective employees are normally distributed with a mean of 100 and a standard deviation of 15.



- About what percent of the scores are between 70 and 130? 95%
- About what percent of the scores are between 85 and 130? 81.5%
- About what percent of the scores are over 115? 16.15%
- About what percent of the scores are lower than 85 or higher than 115? 32%
- If 80 people take the test, how many would you expect to score higher than 130? $80 \cdot (0.0265) = 2.12$
- If 75 people take the test, how many would you expect to score lower than 85? $75 \cdot (0.1615) = 12.11$
- TEMPERATURE** The daily July surface temperature of a lake at a resort has a mean of 82° and a standard deviation of 4.2° . If you prefer to swim when the temperature is at least 77.8° , about what percent of the days does the temperature meet your preference?

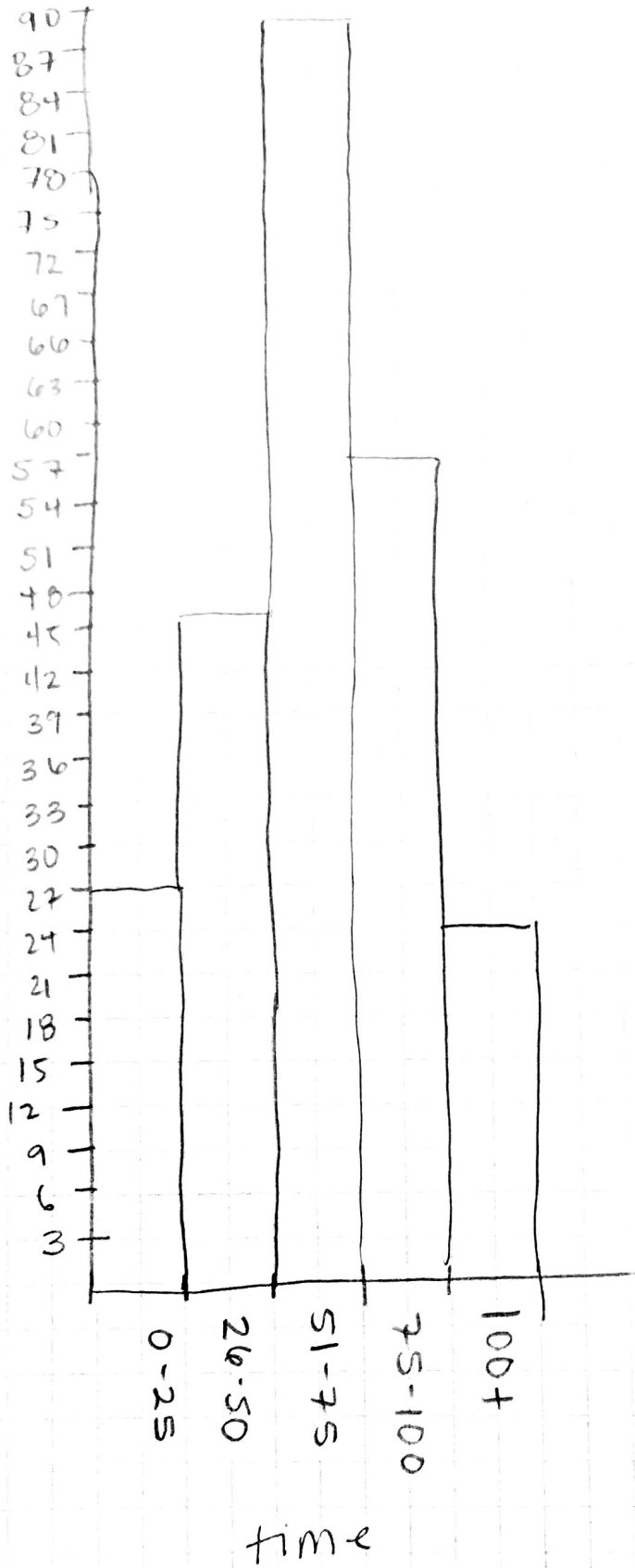
July \rightarrow 31 days
738

$$31 \cdot (0.8415) = 26 \text{ days}$$

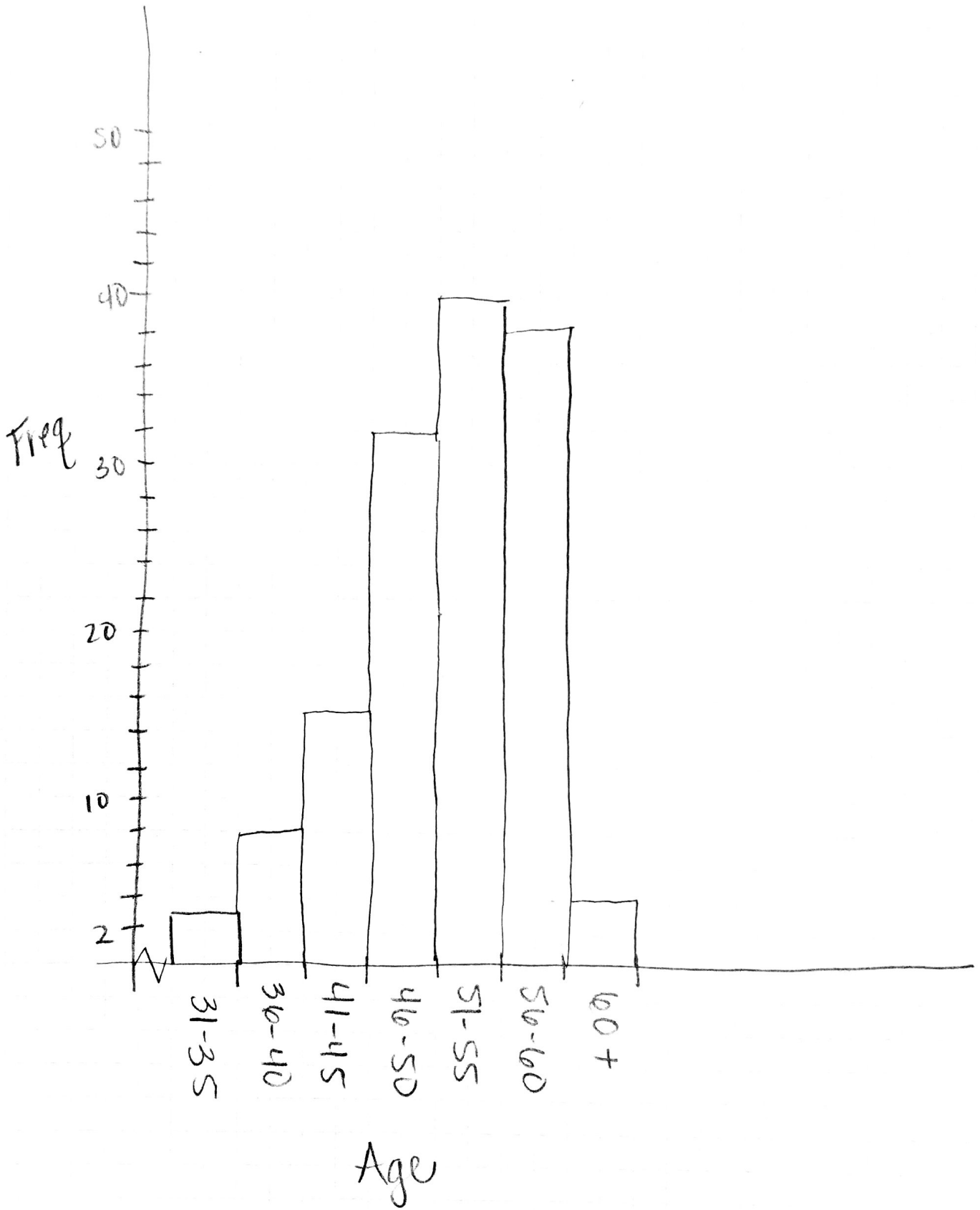


#1

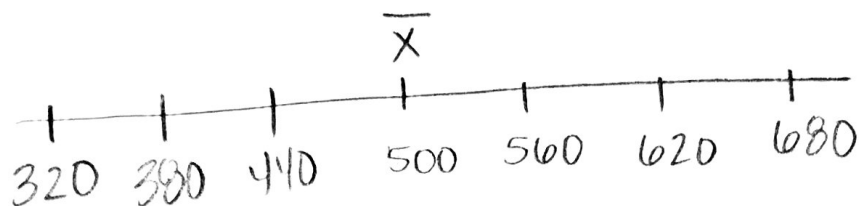
freq



#2



1. The lifetimes of 10,000 watch batteries are normally distributed. The mean lifetime is 500 days. The standard deviation is 60 days. Sketch a normal curve that represents this distribution; label the mean and standard deviation.



Estimate how many watch batteries will last for each of the following intervals.

a.) 440 - 560 days

$$10,000 (0.68) = 6800$$

b.) 380 - 620 days

$$10,000 (0.95) = 9500$$

c.) 320 - 680 days

$$10,000 (0.997) = 9970$$

d.) 410-590 days? (In addition to your answer, also write down what you have to enter into your calculator.)

$$\text{normalcdf}(410, 590, 500, 60) = 0.866 (10,000) = 8663.8$$

2. A group of students weighs 500 US pennies. They find that the pennies have normally distributed weights with a mean of 3.1g and a standard deviation of 0.14g

a) What percentage of pennies will weigh between 2.8 and 3.3g?

$$90.7\%$$

b) What percentage of pennies will weigh between 2.11 and 3.5g?

$$99.7\%$$

c.) What percentage of pennies will weigh less than 2.96g?

$$16.15\%$$

d.) What percentage of pennies will weigh more than 3.4g?

$$1.6\%$$

3. A set of 1000 values has a normal distribution. The mean of the data is 120, and the standard deviation is 20.

a. What percent of the data is in the range 110 to 130?

$$38.2\%$$

b. What percent of the data is in the range 90 to 110?

$$24.1\%$$

c. How many values are within the limits 100 and 150?

$$0.7745(1000) = 774.5$$

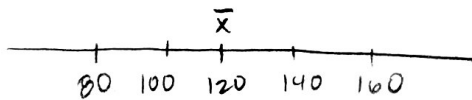
d. How many values are greater than 140?

$$0.1615(1000) = 161.5$$

e. How many values are within one standard deviation from the mean?

$$680$$

* f. Find the symmetric interval about the mean which includes 90% of the data.



$$\text{around } 85 - 155 \Rightarrow 91.9\%$$

* g. Find the symmetric interval about the mean which includes 77% of the data.

$$96 - 144 \Rightarrow 76.9\%$$

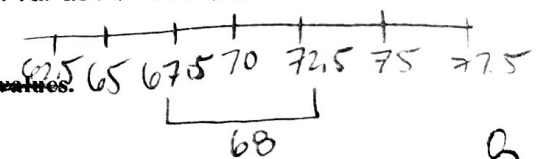
h. Find the point below which 90% of the data lie.

$$146$$

$$67 - 73 = 77\%$$

4. The heights of a large group of men are normally distributed with a mean of 70in. and a standard deviation of 2.5 in. Find an interval about the mean that contains 75% of the heights.

$$67.1 - 72.9$$



* Find the values at the 20th and 80th percentiles for each set of values.

Find the following percentiles of the data set displayed below.

*In order!

20 pieces
of data

27, 28, 29, 29, 30, 31, 32, 33, 34, 35,
36, 36, 37, 38, 39, 40, 40, 41, 42, 43

5. 45th percentile

$$0.45(20) = 9$$

35

6. 70th percentile

$$0.70(20) = 14$$

39

7. 25th percentile

$$0.25(20) = 5$$

31

8. 95th percentile

$$0.95(20) = 19$$

43

9. 80th percentile

$$0.80(20) = 16$$

40

10. 15th percentile

$$0.15(20) = 3$$

29

11. **Error Analysis** Your friend calculated the tenth percentile of the data set shown above and got 35. What error did your friend make? What is the correct answer?

$$0.10(20) = 2 \quad \text{[29]}$$

She went too far!