Applications

1. **Name Lengths of Korean Students**

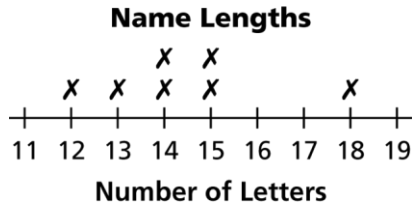| Number of Letters	Frequency
4	0
5	0
6	3
7	4
8	5
9	6
10	3
11	6
12	3

(See Figure 1.)

2. shortest: 6 letters; longest: 12 letters

3. The shape is uniform; there are no clusters or gaps.

4. Answers may vary. The typical name length could be 9 or 13. They are the most frequent name lengths.

5. a. Graph A; Korea (it matches the graph in Exercise 1); Graph B: the United States (they have a name length of 17 letters); Graph C: China (they have fewest letters); Graph D: Japan (there is a large number of names with 12 letters).

b. Answers will vary. Four statements could include: The U.S. graph is the most spread out because it has the biggest range. Both the Korean and U.S. data have two modes, whereas the others have only one. Chinese names are shortest with the data values displayed to the left of the others on the scale. U.S. names are longest with the data values displayed to the right of the others on the scale.

c. Although the graphs are not wrong, the scales are truncated. It is difficult to compare the data sets if the scales are not aligned.

6. 15 letters; mode

7. 30; The bar for each number represents the number of students with that name length, so adding the bar heights $(2 + 3 + 5 + 3 + 6 + 5 + 2 + 1 + 2 + 1)$ gives the total number of students.

8. The data vary from 11 to 20 letters; the range is 9 letters $(20 - 11 = 9)$.

9. 15 letters; There are 30 student name lengths, so the median is between the 15th and 16th data values, which are both 15.

10. a. Half of all rats live less than or equal to 2.5 years, and half live longer than or equal to 2.5 years.

b. Knowing the maximum and minimum ages for rats would be helpful.
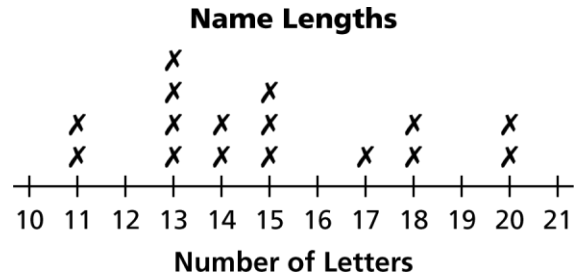
Figure 1

Name Lengths of Korean Students

Number of Letters
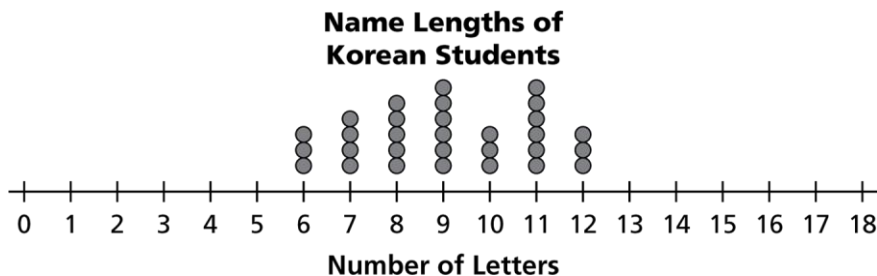
11. Possible answer:
(See Figure 2.)

12. Possible answer:

Name Lengths

```
              ✗  ✗
          ✗  ✗  ✗  ✗              ✗
  +--+--+--+--+--+--+--+--+--+
  11 12 13 14 15 16 17 18 19
```
Number of Letters

13. Possible answer:

Name Lengths

```
                  ✗
                  ✗
              ✗  ✗  ✗  ✗
      ✗      ✗  ✗  ✗  ✗  ✗          ✗
  +--+--+--+--+--+--+--+--+--+--+--+
   7  8  9 10 11 12 13 14 15 16 17 18
```
Number of Letters

14. Possible answer:

Name Lengths

```
              ✗
              ✗      ✗
      ✗      ✗  ✗  ✗          ✗      ✗
      ✗      ✗  ✗  ✗      ✗  ✗      ✗
  +--+--+--+--+--+--+--+--+--+--+--+--+
  10 11 12 13 14 15 16 17 18 19 20 21
```
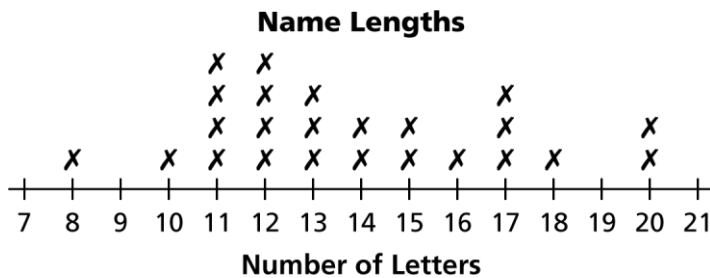**Number of Letters**
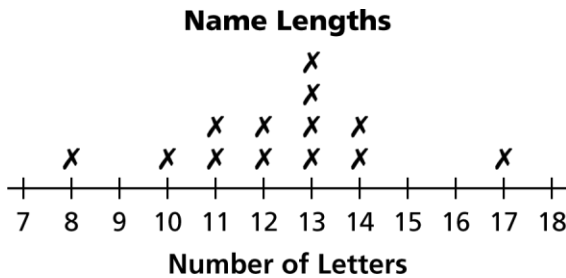
Connections

15. a. The numerator tells you that 14 of the pets represented in the graph are dogs. The denominator, 24, gives the total number of pets owned by the class.

b. It is not possible to determine the exact number of students surveyed. Some students may have more than one pet; some may have no pets.

16. a. numbers divisible by 5; multiples of 5

b. odd numbers

c. square numbers

d. prime numbers

Figure 2

Name Lengths

```
                  ✗  ✗
                  ✗  ✗  ✗                  ✗
                  ✗  ✗  ✗  ✗  ✗            ✗              ✗
      ✗          ✗  ✗  ✗  ✗  ✗  ✗  ✗  ✗  ✗      ✗
  +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
   7  8  9 10 11 12 13 14 15 16 17 18 19 20 21
```
**Number of Letters**

17. (See Figure 3. Figure 3 provides a snapshot of the full graph from which you can identify patterns.)

   a. Prime numbers; they each have 1 in common as a factor; the other factor is the number itself.

   b. Numbers that end in 0, 2, 4, 6, or 8 are even; all have 2 as a factor.

   c. i. The greatest factor for any number is the number itself.

   ii. The least factor is 1.

   iii. The second-greatest factor is the number divided by its least prime factor. In particular, if the number is even, then the second-greatest factor is the number divided by 2.

   iv. Answers will vary given students' own observations.

18. a. The graph is trying to show sunglasses sales from a certain store for two months. The graph has a deceptive *y*-scale because it does not start at 0.

This makes it look like sunglasses sales plummeted, when in fact they dropped by only a small percentage.

   b. The graph is trying to show how many friends are made during each month in a new school. In the graph, the *y*-scale is not marked in equal increments.

   c. The graph is trying to show how many people own a certain type of pet. The lengths of the lines of animals are deceptive. The different animals have different sizes, even though each animal represents the same number of pets. For example, the line for cats is about the same size as the line for horses, even though there are many more cats represented than horses.

19. a. Answers will vary: Possible answers: Trevor grew least between 8 and 9 years. Trevor more than doubled his birth height by the age of 4.

   b. Answers will vary. Possible answers: Trey was 18 inches at birth; he grew fastest in the first two years.

Figure 3

Numbers and Factors
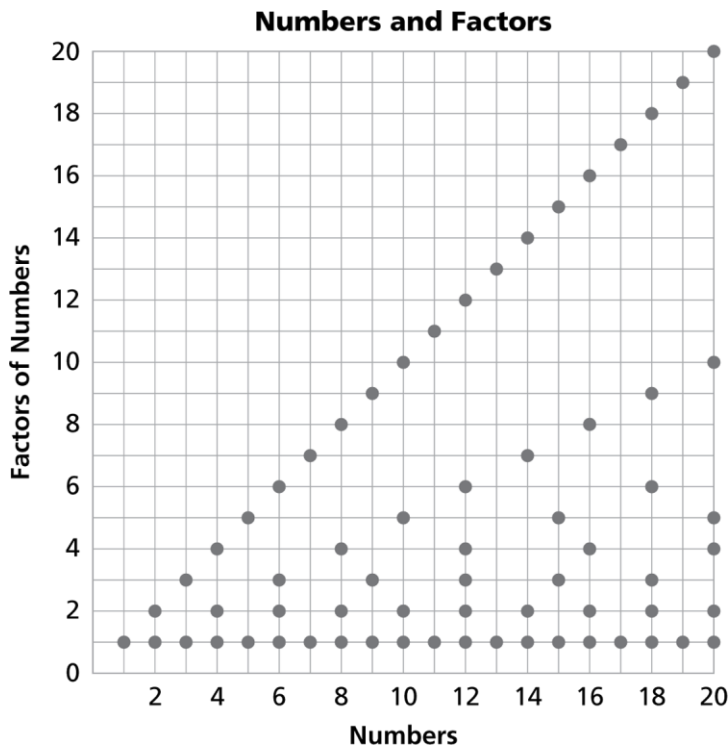
c. Answers will vary. Possible answers: Trevor was longer at birth than Trey was at birth. Trey was always shorter than Trevor when comparing them at the same age.

d. Suzanne is correct that Trevor is taller than Trey, at least up until age 8. After age 8, Trey's data is not collected, so a comparison cannot be made. Suzanne is incorrect that Trevor is growing faster than his brother Trey. Between ages 2 and 4, Trey grew at a faster rate then Trevor.

20. a. (See Figure 4.)

b. Answers will vary. Sample answers: Fuzz Ball grew the least from Day 11 to Day 27. Sleepy grew the most from Day 18 to Day 27.

c. Answers will vary. One could say the following: Gerbils grow very quickly, approximately doubling or tripling their weights from week 2 to week 4.

21. Possible answer: Graph A and Graph B are labeled 1 through 12 on the horizontal axis. However, the distribution in Graph A is unlikely for this data since few families have 7–8 children. Graph B is unlikely since few families now have 10 or 12 children. Graph C is most likely the graph that shows the number of children in the students' families.

22. Possible answer: Either Graph A or B could show the birth months. Graph C is unlikely since it would be unusual for no students in the class to have been born in November or December.

23. Possible answer: Graph C is the most likely answer. Some students may like only one topping. Twelve toppings seems excessive.

Figure 4

Growth in Mass of Gerbils
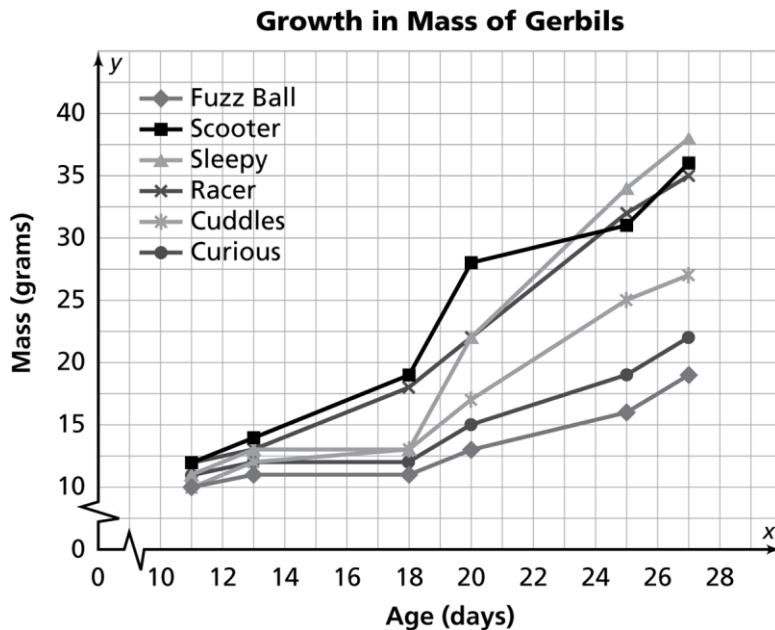
Extensions

24. The bar height, 7, represents the number of stickers left. Because there were 12 to begin with, 5 have been sold.

25. The bar height, 4, represents the number of street signs left. Since there were 12 signs to begin with, 8 have been sold.

26. Stickers are more popular. The bar graphs show that the number of stickers remaining (48) is less than the number of street signs remaining (66). Students may want to debate this because of the "peaks" in the data. You will want to remind them that the bar graphs show the number remaining, not the number sold.

27. The store has taken in $144 on the sale of 96 name stickers.

28. The most stickers, 12, have been sold for Amanda. The fewest stickers, 2, have been sold for Ava.

29. For Amy, the bars for stickers and signs are the same height. This shows that equal numbers of stickers and signs have been sold for the name Amy.

30. The stacked bars allow you to look at the data for stickers and street signs together. For example, Amanda has 0 stickers and 11 street signs left, while Alex has 7 stickers and 4 street signs remaining. These names have the same total number of items remaining. This is indicated by the stacked bars, which are the same height. Students will see that Allison and Amber are the most popular names, while Ava is the least popular.