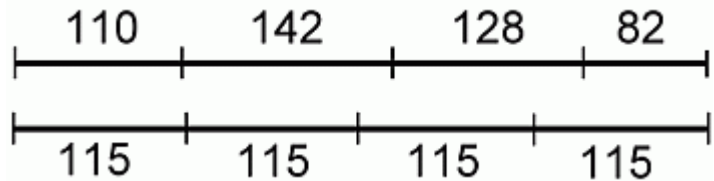# Average

The Millers went on a trip. The first day, they drove 110 miles, the second day, 142 miles, the third day, 128 miles, and the last day, 82 miles. The Millers drove a total of 460 miles.

In the diagram, we have put those distances as sticks one after another, though of course in reality they did not drive just straight stretches of roads.

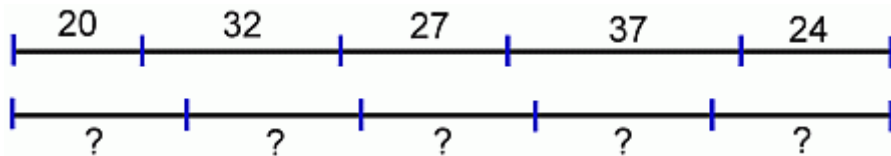| 110 | 142 | 128 | 82 |

| 115 | 115 | 115 | 115 |

IF they had driven 115 miles each day, it would have totaled the same 460 miles.

On average, the Millers drove 115 miles a day, or their *average* mileage was 115 miles.

What is the average of 20, 32, 27, 37, and 24?

First find the total by adding. Then, divide that into equal parts.

| 20 | 32 | 27 | 37 | 24 |

| ? | ? | ? | ? | ? |

$20 + 32 + 27 + 37 + 24 = 140.$ $140 \div 5 = 28.$

The average of 20, 32, 27, 37, and 24 is 28.

If these number were, for example, the ages of club members, we can say the average age of the members is 28 years. However, they could also be distances, or weights, or volumes, or just plain numbers.

1. Judith's test scores were 78, 87, 69, and 86.
   Find her average score.

2. John measured the temperature five times during a day.
   These are his measuring results:
   18°C, 22°C, 26°C, 23°C, and 16°C.
   Find the average temperature for the day.

3. Dad drove a 414 km stretch in six hours.
   How many kilometers did he drive,
   on the average, in one hour?

You can also use the average "backwards":

> *During a 20-hour drive from Denver to Dallas, Dad's average speed was 40 miles per hour. How far is Denver from Dallas?*

You can multiply 20 hours × 40 miles/hour = 800 miles.

Note that in reality, he did not drive with a totally even speed all of the time because he had to stop at crossings, slow down on curves, stop for a snack and so on. We do not know how his speed varied on the trip. All we are given is that his *average* speed was 40 miles per hour. (And, of course the average speed was calculated by dividing the length of the trip by the total number of hours the trip took.)

4. The average pay of a translator is $42 per hour.
   How much would it cost to hire a translator for 11 hours?

5. The package of eggs says that an egg's average weight is 55 grams.
   How much would a dozen eggs weigh?

6. Mom's weekly grocery bills in June were $234, $178, $250, and $198.
   How much did Mom spend on groceries in June?
   What was her average weekly grocery bill?

7. For her hospital stay, mom was charged an average of $76 daily.
   What was the total cost of her one-week stay?

8. The kids ran a race. These are the resulting times:

Ann	12 min
Judy	15 min
Rose	14 min
Elizabeth	19 min
Grace	12 min
Nancy	18 min

Michael	12 min
Greg	10 min
James	11 min
Caleb	15 min
Hans	17 min

Find the girls' average running time and the boys' average running time separately.

Are boys or girls quicker on the average?

What is the difference of the two averages?

9. Maria was studying how much 1-year old roosters usually weigh. She went to a farm and weighed 20 roosters. The numbers below are their weights, in *ounces*.

96, 94, 90, 101, 84, 102, 101, 95, 108, 113, 87, 95, 97, 84, 90, 99, 89, 93, 92, 100.

a. Make a bar graph of the data.
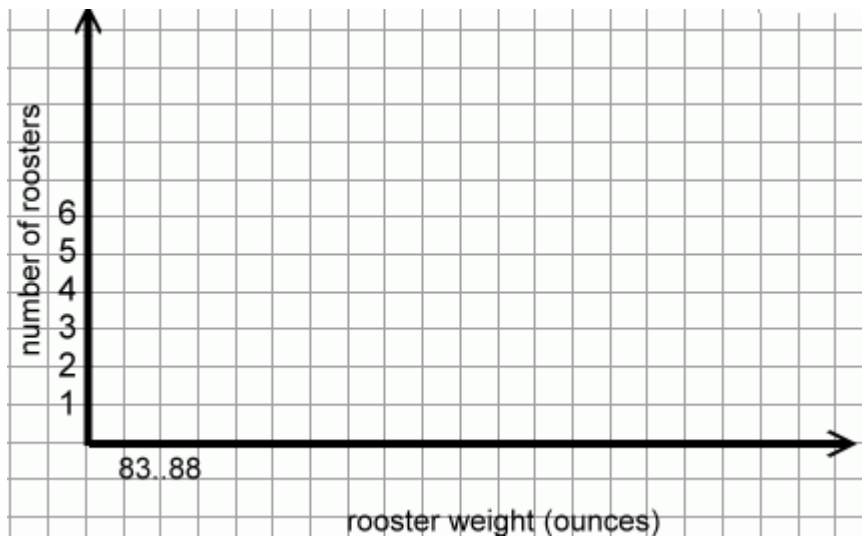
Weight (ounces)	Frequency
83..88	
89..94	
95..100	
101..106	
107..112	
113..118	

b. Maria calculated the average several times, and got different results from her calculator. She must have made errors in punching the buttons! Use the graph and the data to figure out which one is the *correct answer:* 89 ounces, 95 1/2 ounces, or 100 1/2 ounces?

10. Here you see ten students' quiz scores. 24 20 24 16 28 30 14 22 23 19

**a.** Make a frequency table and a bar graph.
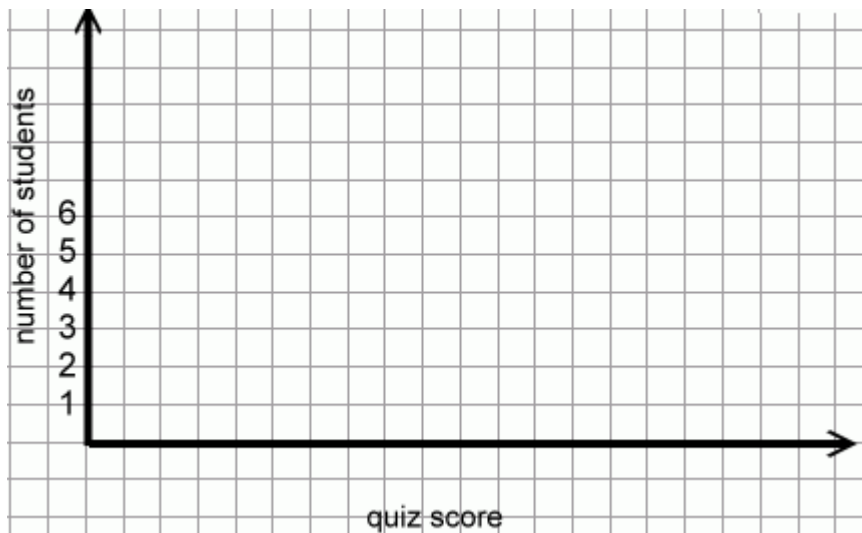
Test score	Frequency
13..15	
16..18	
19..21	
22..24	
25..27	
28..30	

b. Calculate the average score.

c. Both the bar graph and the average tell us what the "middle" or "typical" result in the test was. Explain how you can guess what the average is approximately, just using the graph.

1. Judith's average score is 80.

2. Average temperature for the day was 21°C.

3. Dad averaged 69 km in one hour.

4. 11 × $42 = $462

5. 660 g

6. She spent $860; weekly average $215

7. $532

8. The girls' average time is 15 min, and the boys' average time is 13 min. The boys are quicker. The difference is 2 min.
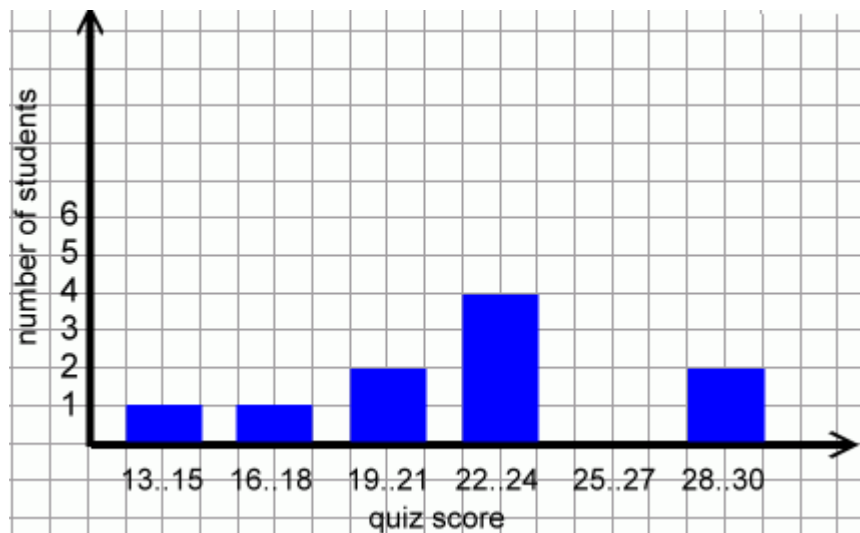
9. a.
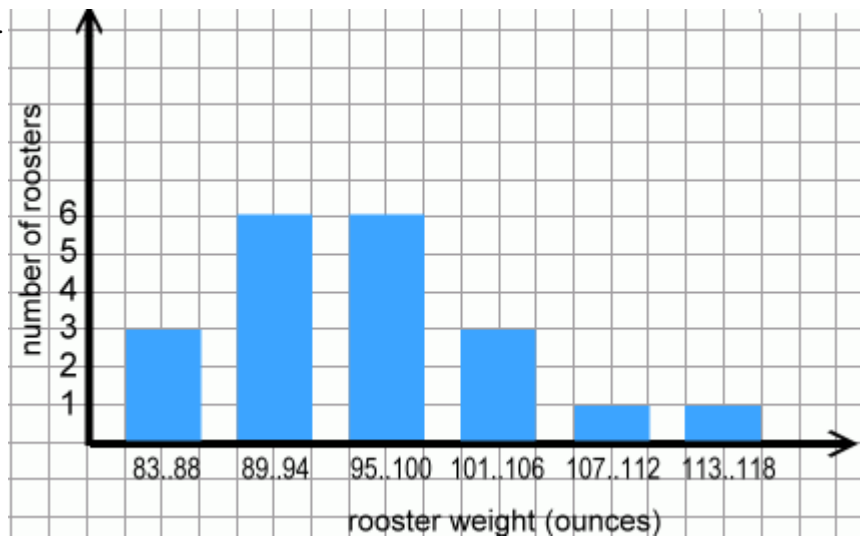
Weight (ounces)	Frequency
83..88	3
89..94	6
95..100	6
101..106	3
107..112	1
113..118	1

b. 95 1/2 ounces. You can see this in the bar graph because the number 95 1/2 is near the middle and near the peak of the graph. You could also see it from the data itself, noting that lots of chicken weights are 90-something.

10. a.

Test score	Frequency
13..15	1
16..18	1
19..21	2
22..24	4
25..27	0
28..30	2

b. The average is 22.

c. Look at the "peak" of the graph. The average is usually near that point.