Table 12-1 Performance IQ Scores of Children

Low Blood Lead Level															
85	90	107	85	100	97	101	64	111	100	76	136	100	90	135	104
149	99	107	99	113	104	101	111	118	99	122	87	118	113	128	121
111	104	51	100	113	82	146	107	83	108	93	114	113	94	106	92
79	129	114	99	110	90	85	94	127	101	99	113	80	115	85	112
112	92	97	97	91	105	84	95	108	118	118	86	89	100		
Medium Blood Lead Level															
78	97	107	80	90	83	101	121	108	100	110	111	97	51	94	80
101	92	100	77	108	85										
High Blood Lead Level															
93	100	97	79	97	71	111	99	85	99	97	111	104	93	90	107
108	78	95	78	86											

allow us to recognize any real differences. We could use the methods of Section 9-3 to compare means from samples collected from *two* different populations, but here we need to compare means from samples collected from *three* different populations. When we have samples from three or more populations, we can test for equality of the population means by using the method of *analysis of variance* introduced in Section 12-2. In Section 12-2, we will use analysis of variance to test the claim that the three samples are from populations with the same mean.

12-1 Review and Preview

Section 9-3 includes methods for testing equality of means from *two* independent populations. In Section 12-2 we will learn how to test for equality of *three or more* population means by using the method of one-way analysis of variance. The term *one-way* is used because the sample data are separated into groups according to *one* characteristic. Instead of referring to the main objective of testing for equal means, the term *analysis of variance* refers to the *method* we use, which is based on an analysis of sample variances.

In Section 12-3 we learn how to compare populations separated into categories using *two* characteristics (or factors), such as gender and eye color. Because the sample data are categorized according to two different factors, the method is referred to as *two-way* analysis of variance.

F Distribution

The analysis of variance (ANOVA) methods of this chapter require the *F* distribution, which was first introduced in Section 9-5. In Section 9-5 we noted that the *F* distribution has the following properties (see Figure 12-1):

1. The *F* distribution is not symmetric.
2. Values of the *F* distribution cannot be negative.
3. The exact shape of the *F* distribution depends on the two different degrees of freedom.