The significance level is $\alpha = 0.05$.

**Step 1:** Use technology to obtain ANOVA results, such as one of those shown in the accompanying displays.

### STATDISK

| Source: | DF: | SS: | MS: | Test Stat, F: | Critical F: | P-Value: |
|---|---|---|---|---|---|---|
| Treatment: | 2 | 2022.729906 | 1011.364953 | 4.071122 | 3.073087 | 0.01951 |
| Error: | 118 | 29314.046953 | 248.424127 | | | |
| Total: | 120 | 31336.77686 | | | | |

### MINITAB

**One-way ANOVA: Low, Medium, High**

| Source | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Factor | 2 | 2023 | 1011 | 4.07 | 0.020 |
| Error | 118 | 29314 | 248 | | |
| Total | 120 | 31337 | | | |

S = 15.76 R-Sq = 6.45% R-Sq(adj) = 4.87%

### EXCEL

ANOVA

| Source of Variation | SS | df | MS | F | P-value | F crit |
|---|---|---|---|---|---|---|
| Between Groups | 2022.729906 | 2 | 1011.364953 | 4.071122103 | 0.019510883 | 3.073090341 |
| Within Groups | 29314.04695 | 118 | 248.4241267 | | | |
| | | | | | | |
| Total | 31336.77686 | 120 | | | | |

### STATCRUNCH

**ANOVA table**

| Source | df | SS | MS | F-Stat | P-value |
|---|---|---|---|---|---|
| Treatments | 2 | 2022.7299 | 1011.3649 | 4.071122 | 0.0195 |
| Error | 118 | 29314.047 | 248.42413 | | |
| Total | 120 | 31336.777 | | | |

### TI-83/84 PLUS

```
One-way ANOVA
 F=4.071122103
 p=.0195103826
 Factor
  df=2
  SS=2022.72991
↓ MS=1011.36495
```

### SPSS

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 2022.730 | 2 | 1011.365 | 4.071 | .020 |
| Within Groups | 29314.047 | 118 | 248.424 | | |
| Total | 31336.777 | 120 | | | |

### JMP

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 2022.730 | 1011.36 | 4.0711 |
| Error | 118 | 29314.047 | 248.42 | Prob > F |
| C. Total | 120 | 31336.777 | | 0.0195* |

**Step 2:** The displays all show that the *P*-value is 0.020 when rounded.

**Step 3:** Because the *P*-value of 0.020 is less than the significance level of $\alpha = 0.05$, we reject the null hypothesis of equal means. (If the *P* is low, the null must go.)

## Interpretation

There is sufficient evidence to warrant rejection of the claim that the three samples come from populations with means that are all equal. Based on the samples of measurements listed in Table 12-1, we conclude that those values come from populations having means that are not all the same. On the basis of this ANOVA test, we cannot conclude that any particular mean is different from the others, but we can informally note that the sample mean for the low blood lead group is higher than the means for the medium and high blood lead groups. It appears that greater blood lead levels are associated with lower performance IQ scores.