

# **Idaho End of Course Assessments**

**High School Biology, 2015-2019**

**High School Chemistry, 2015-2019**

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Idaho Ed Statistics**

<b>Idaho High School <b>Biology</b> End of Course Test</b>			
<b>Year</b>	<b>Number of Students</b>	<b>Average Score</b>	<b>Standard Deviation</b>
<b>2014 - 2015</b>	<b>18,855</b>	<b>206.97</b>	<b>19.191</b>
<b>2015 - 2016</b>	<b>20,159</b>	<b>206.41</b>	<b>16.241</b>
<b>2016 - 2017</b>	<b>20,927</b>	<b>205.00</b>	<b>19.013</b>
<b>2017 - 2018</b>	<b>20,645</b>	<b>204.84</b>	<b>19.201</b>
<b>2018 - 2019</b>	<b>22,116</b>	<b>204.96</b>	<b>19.397</b>
<b>Idaho High School <b>Chemistry</b> End of Course Test</b>			
<b>Year</b>	<b>Number of Students</b>	<b>Average Score</b>	<b>Standard Deviation</b>
<b>2014 - 2015</b>	<b>1,783</b>	<b>215.33</b>	<b>19.101</b>
<b>2015 - 2016</b>	<b>2,738</b>	<b>209.85</b>	<b>14.634</b>
<b>2016 - 2017</b>	<b>3,757</b>	<b>209.00</b>	<b>21.193</b>
<b>2017 - 2018</b>	<b>2,875</b>	<b>211.11</b>	<b>19.354</b>
<b>2018 - 2019</b>	<b>2,686</b>	<b>212.43</b>	<b>20.297</b>

Source: Idaho State Department of Education

The Idaho State Department of Education provided the number of students, average score and standard deviation for the biology and chemistry tests from 2015 through 2019. The average scores and the standard deviations were used to calculate effect sizes and percentiles for the science tests.

# Idaho End of Course Assessments

## High School Biology

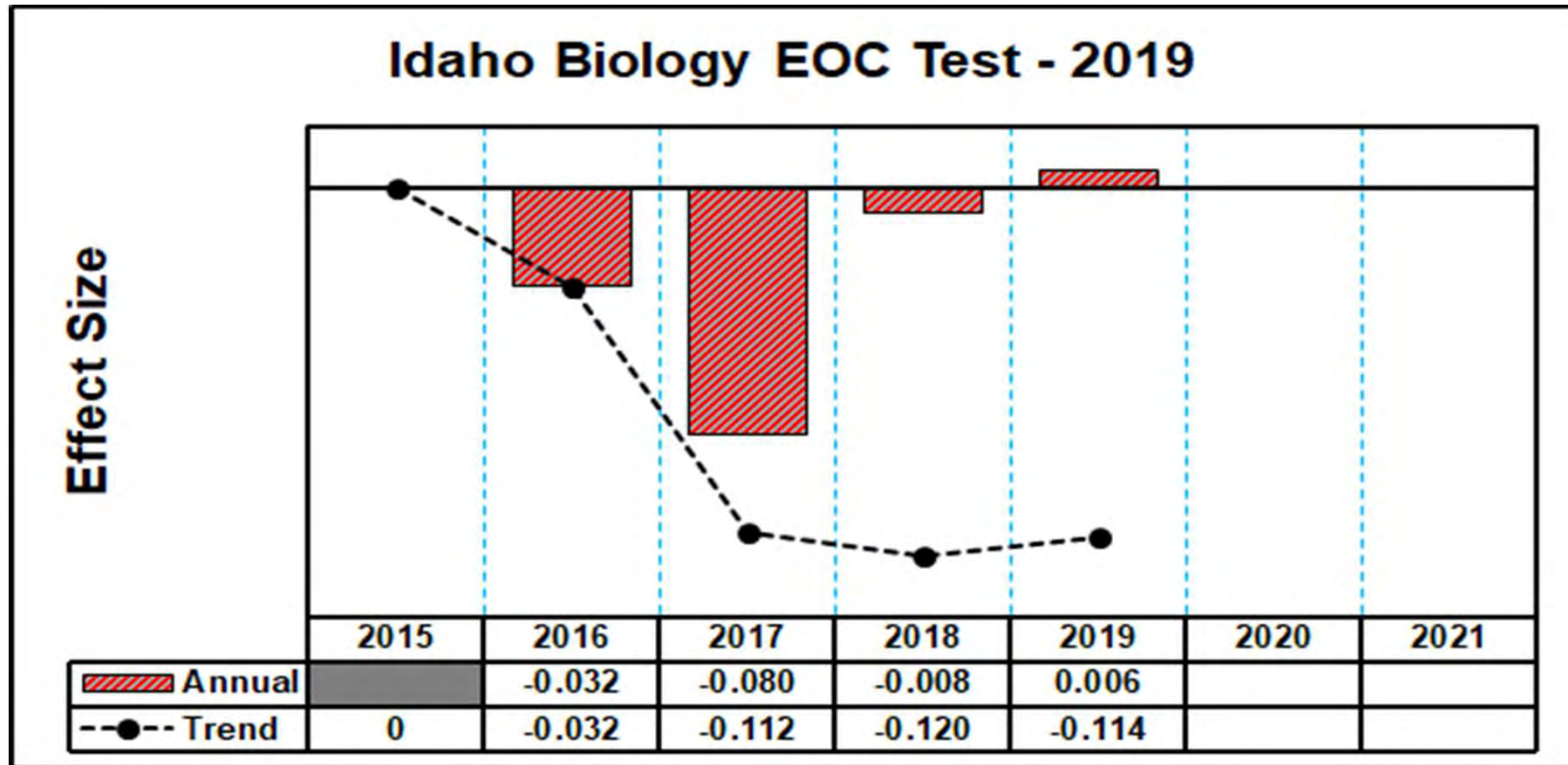
## About Effect Sizes

The effect size represents the practical significance of the difference between two means, not a statistical significance.

**CAUTION:** Don't compare the size of bar graphs from different graphs. Excel 2019 selects a y-axis scale that best fills the plot area. This means that bars for large annual effect sizes or a large trend effect size may be "reduced in size" to FIT the plot area. On the other hand, bars for small annual effect sizes or trend effect sizes may be "increased in size" to FILL the plot area.

The State Department of Education provided the means and standard deviations. The "difference between two means" effect size was calculated using the displayed formula. The Subscript 1 indicates data from Group 1, last year or pretest; Subscript 2 is data from Group 2, this year or posttest. If this year's mean is higher than last year's mean, the effect size is indicated by a positive bar ("above the x-axis"). If lower this year than last year, a negative bar is seen ("below the x-axis"). If a zero difference there is no bar.

$$\frac{\bar{X}_2 - \bar{X}_1}{\sqrt{\frac{s_1^2 + s_2^2}{2}}}$$



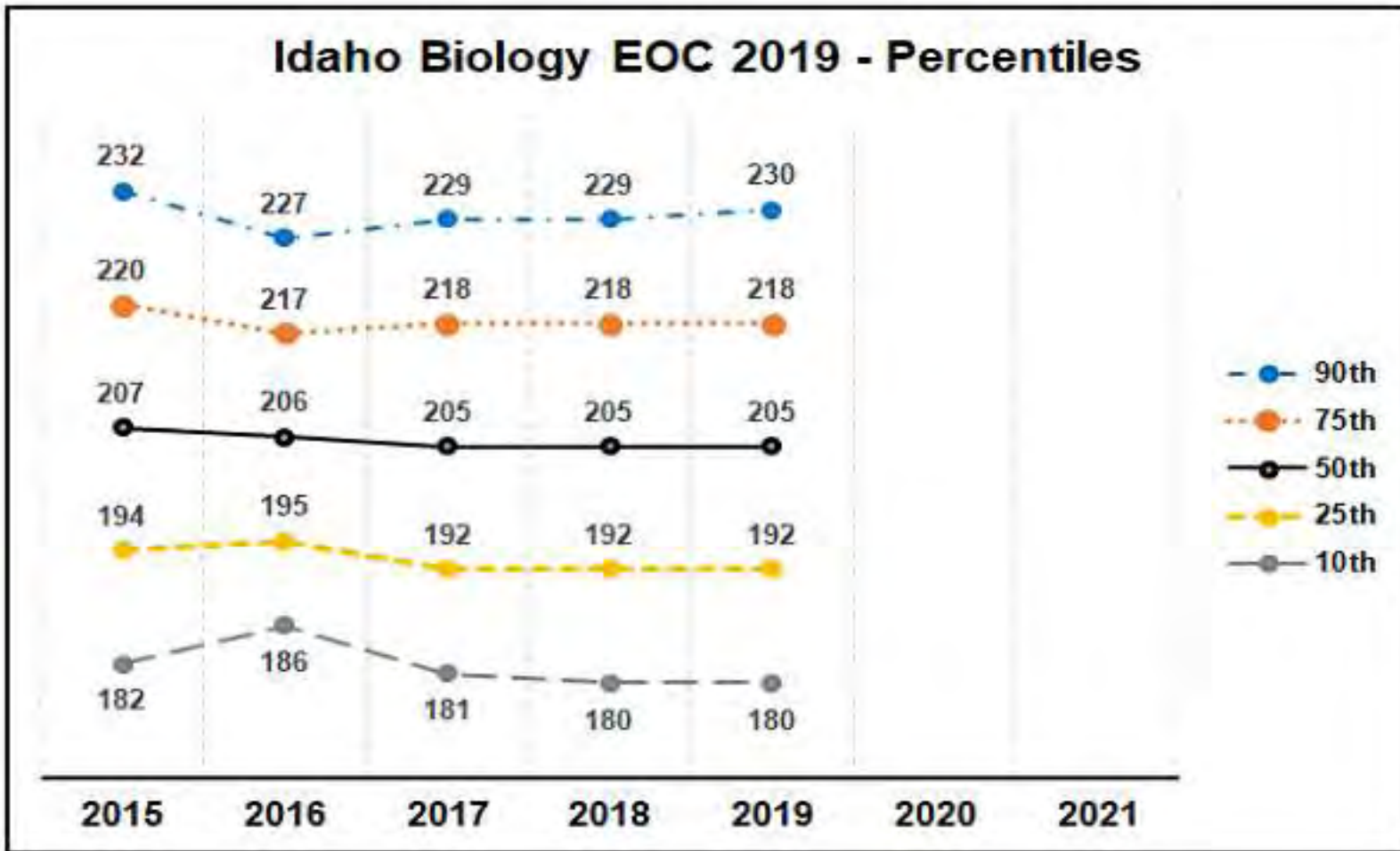
Following negative effect sizes in 2016, 2017 and 2018, Idaho high school students had a positive effect size for biology in 2019. The small negative effect size in 2018 and a small positive effect size in 2019 turned the trend line towards positive, while still remaining deep in the negative area.

## About Percentiles

Percentiles highlight student performance at five points across a scale score distribution. They enable us to look at the change in each of the five performance levels from year to year and trends. The five percentiles (i.e., scale scores) may be understood as:

- o **High Score**, at or above 90% of the scale scores on the test-grade
- o **High Average Score**, at or above 75% of the scale scores
- o **Average Score**, at or above 50% of scale scores
- o **Low Average Score**, at or above 25% of the scale scores
- o **Low Score**, at or above 10% of the scale scores

A **percentile = (z-score x standard deviation) + mean**. The State Department of Education provided the mean and standard deviation. The z-score for each of the five target percentiles was looked up in a “Proportions of Area under the Normal Curve” table, available in statistics textbooks.





<b>Idaho Biology EOC 2016-2019</b>				
<b>Annual Scale Score Gain/Loss by Percentile</b>				
<b>Percentile</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>90th</b>	<b>-5</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>75th</b>	<b>-3</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>50th</b>	<b>-1</b>	<b>-1</b>	<b>0</b>	<b>0</b>
<b>25th</b>	<b>1</b>	<b>-3</b>	<b>0</b>	<b>0</b>
<b>10th</b>	<b>4</b>	<b>-5</b>	<b>-1</b>	<b>0</b>

The typical pattern for the scale score gain or loss by percentile from year to year is that the upper percentiles tend to gain more (or lose less) than do the lower percentiles. Idaho high school biology students exhibited the typical gain/loss pattern in 2017, 2018 and 2019, but exhibited a reverse of the typical gain/loss pattern in 2016.



# Idaho End of Course Assessments

## High School Chemistry

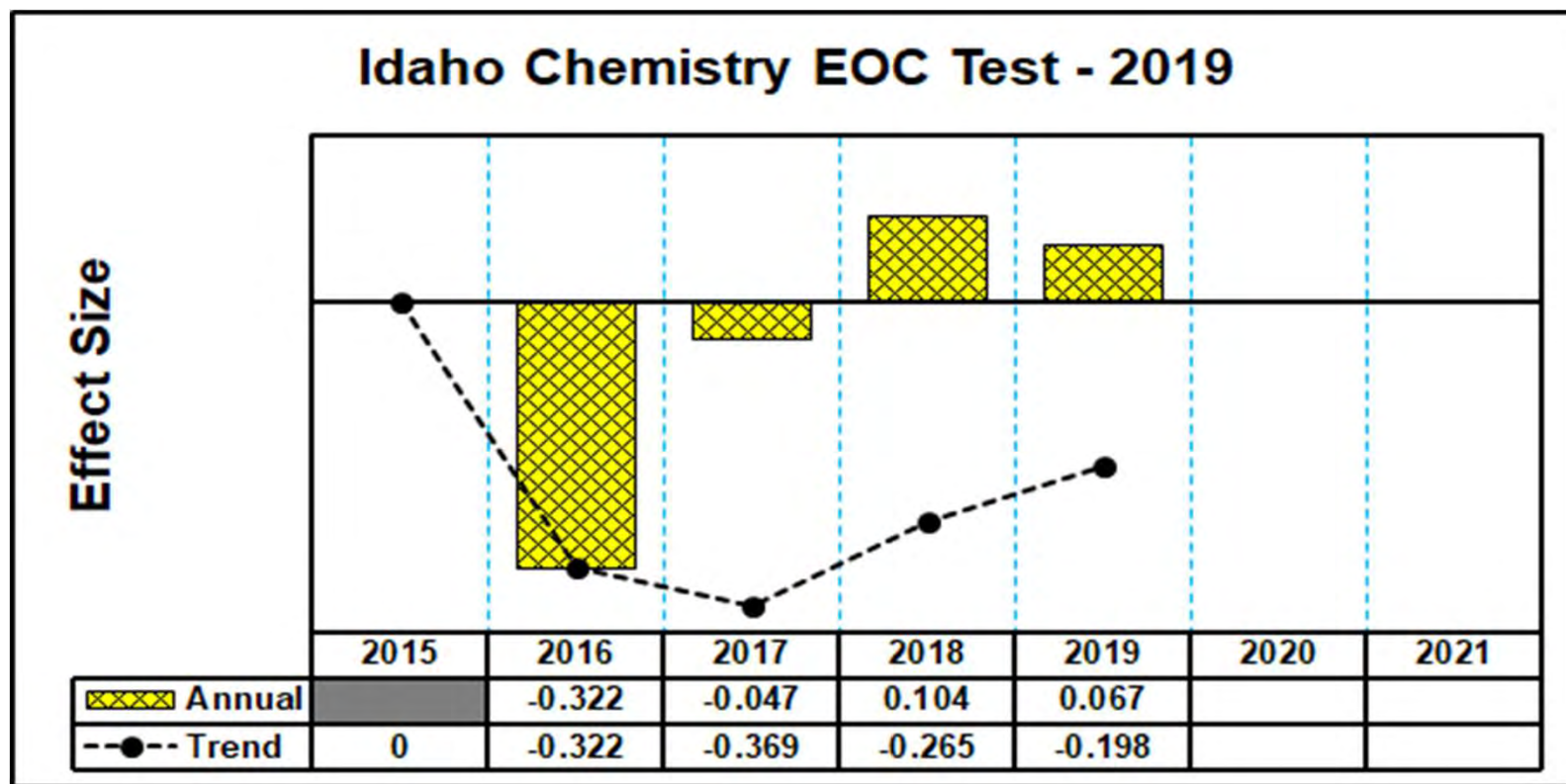
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The State Department of Education provided the means and standard deviations. The "difference between two means" effect size was calculated using the displayed formula. The Subscript 1 indicates data from Group 1, last year or pretest; Subscript 2 is data from Group 2, this year or posttest. If this year's mean is higher than last year's mean, the effect size is indicated by a positive bar ("above the x-axis"). If lower this year than last year, a negative bar is seen ("below the x-axis"). If a zero difference there is no bar.

$$\frac{\bar{X}_2 - \bar{X}_1}{\sqrt{\frac{S_1^2 + S_2^2}{2}}}$$



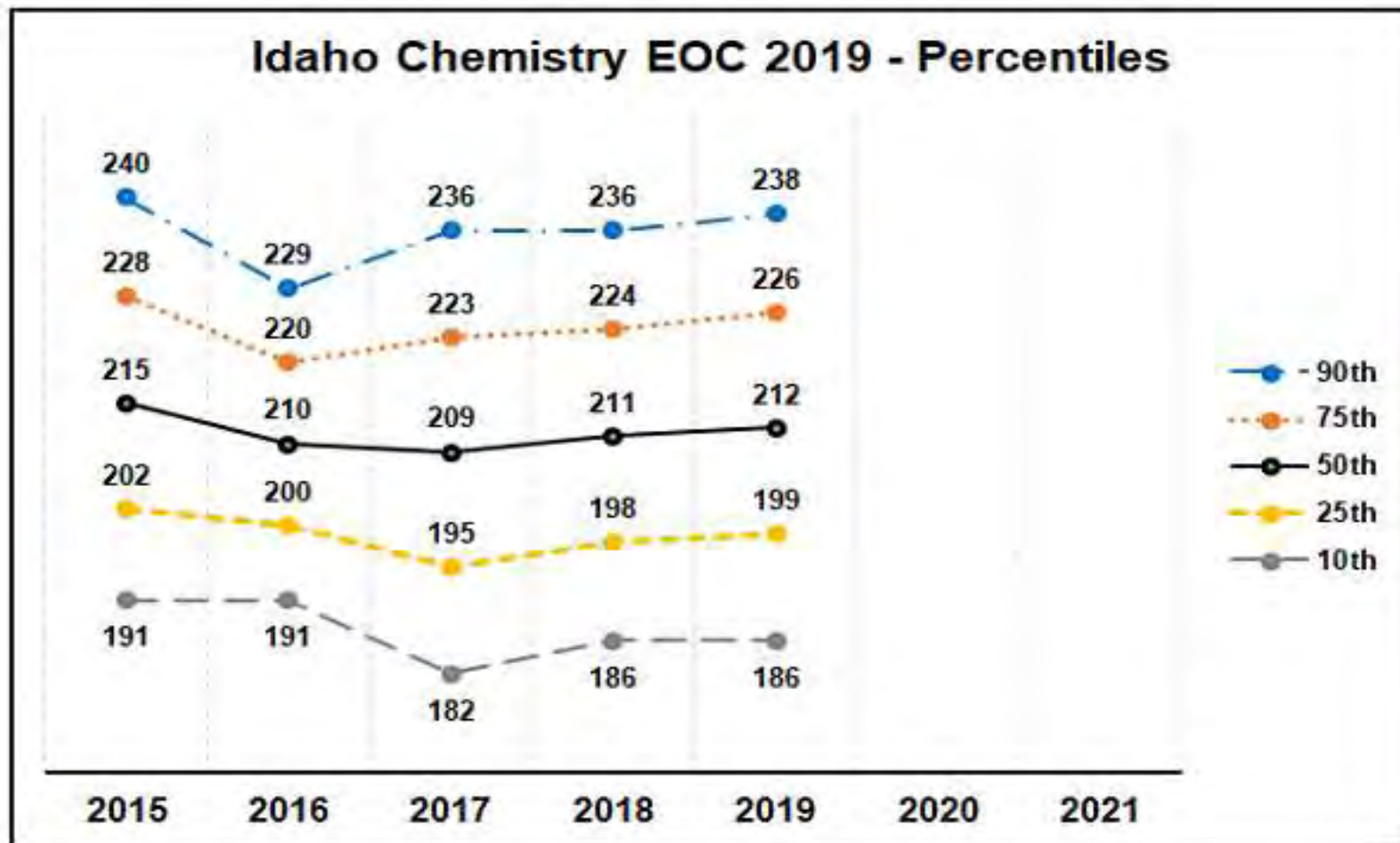
Idaho high school chemistry students had negative effect sizes in 2016 and 2017, but positive effect sizes in 2018 and 2019. The trend line was increasingly negative from 2015-17, but turned toward positive in 2018 and continued in 2019. However, in 2019 the trend line was still in the negative area.

## About Percentiles

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- o **Low Score**, at or above 10% of the scale scores

A **percentile = (z-score x standard deviation) + mean**. The State Department of Education provided the mean and standard deviation. The z-score for each of the five target percentiles was looked up in a “Proportions of Area under the Normal Curve” table, available in statistics textbooks.



<b>Idaho Chemistry EOC 2016-2019</b>				
<b>Annual Scale Score Gain/Loss by Percentile</b>				
<b>Percentile</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>90th</b>	<b>-11</b>	<b>7</b>	<b>0</b>	<b>2</b>
<b>75th</b>	<b>-8</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>50th</b>	<b>-5</b>	<b>-1</b>	<b>2</b>	<b>1</b>
<b>25th</b>	<b>-2</b>	<b>-5</b>	<b>3</b>	<b>1</b>
<b>10th</b>	<b>0</b>	<b>-9</b>	<b>4</b>	<b>0</b>

The typical pattern for the scale score gain or loss by percentile from year to year is that the upper percentiles tend to gain more (or lose less) than do the lower percentiles. Idaho high school chemistry students exhibited the typical gain/loss pattern in 2017 and 2019, but exhibited a reverse of the typical gain/loss pattern in 2016 and 2018.

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