

OSTP Science Data Interpretation Guidebook



Table of Contents

Introduction	3
About the Oklahoma School Testing Program (OSTP)	4
About OSTP Data	5
OSTP Performance Level Data: Are we on Track?	7
Oklahoma Performance Index (OPI) Scores: Are we progressing?	8
OSTP Reporting Category Indicators: Where are our Strengths?	9
Reporting Category Analysis: Science	10
Next Steps	12
Appendix: 2019 Grades 3-8 State Assessment Results	13

Introduction

The Oklahoma State Department of Education (OSDE) believes that **all students can grow and all schools can improve**. The OSDE is committed to ensuring that the Oklahoma School Testing Program (OSTP) is both effective and meaningful to families, districts, educators, and members of the community. Assessments within the OSTP are:



It is important to note that, while the OSTP assessments do not capture everything our students are capable of or learn in school, the OSTP assessments are a reliable way to objectively measure student performance across the state. Statewide data allows educators and community leaders to see gaps in learning among student groups as compared to other students across the state. These assessments also provide evidence that can inform school and district leaders and local educators on the instructional changes needed to strengthen student outcomes in their district.

About the Oklahoma School Testing Program (OSTP)

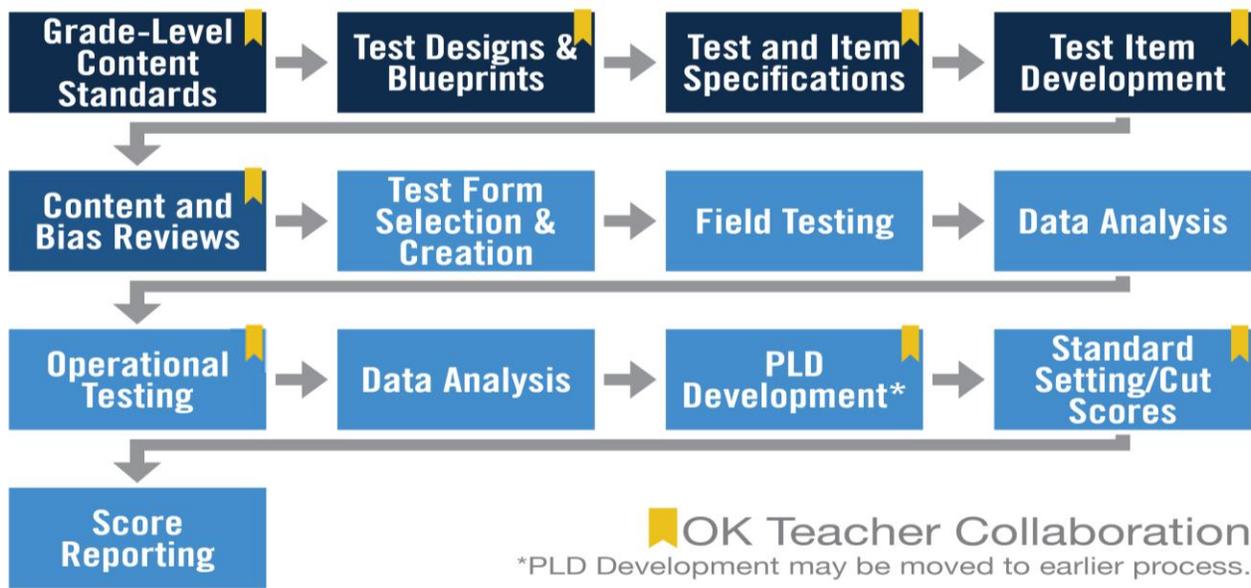
Oklahoma recognizes that a **robust assessment system** is tied closely to students’ learning and teachers’ instructional practices by valuing and promoting **local, classroom-based formative assessments** that help make **student learning visible**. At the same time, that system should provide a **strong summative assessment** program that fits as a component within a multifaceted state, district and school accountability system. [Oklahoma ESSA Plan pp 48-49](#)



The OSTP consists of Oklahoma’s grade-level and College- and Career-Ready Assessments (CCRA) in English Language Arts (ELA), math, science, and U.S. History. The OSTP assessments tell how students are growing in the knowledge, skills, and abilities outlined in the Oklahoma Academic Standards (OAS). OSTP results support state and federal accountability and allow the public to know how their local schools are performing compared to others around the state.

Development of the OSTP is an extensive, ongoing process that ensures our state assessments are valid and appropriate measures of student knowledge, skills, and abilities. The OSDE works with groups of Oklahoma educators and the testing vendors to develop the OSTP.

OSTP Development Process



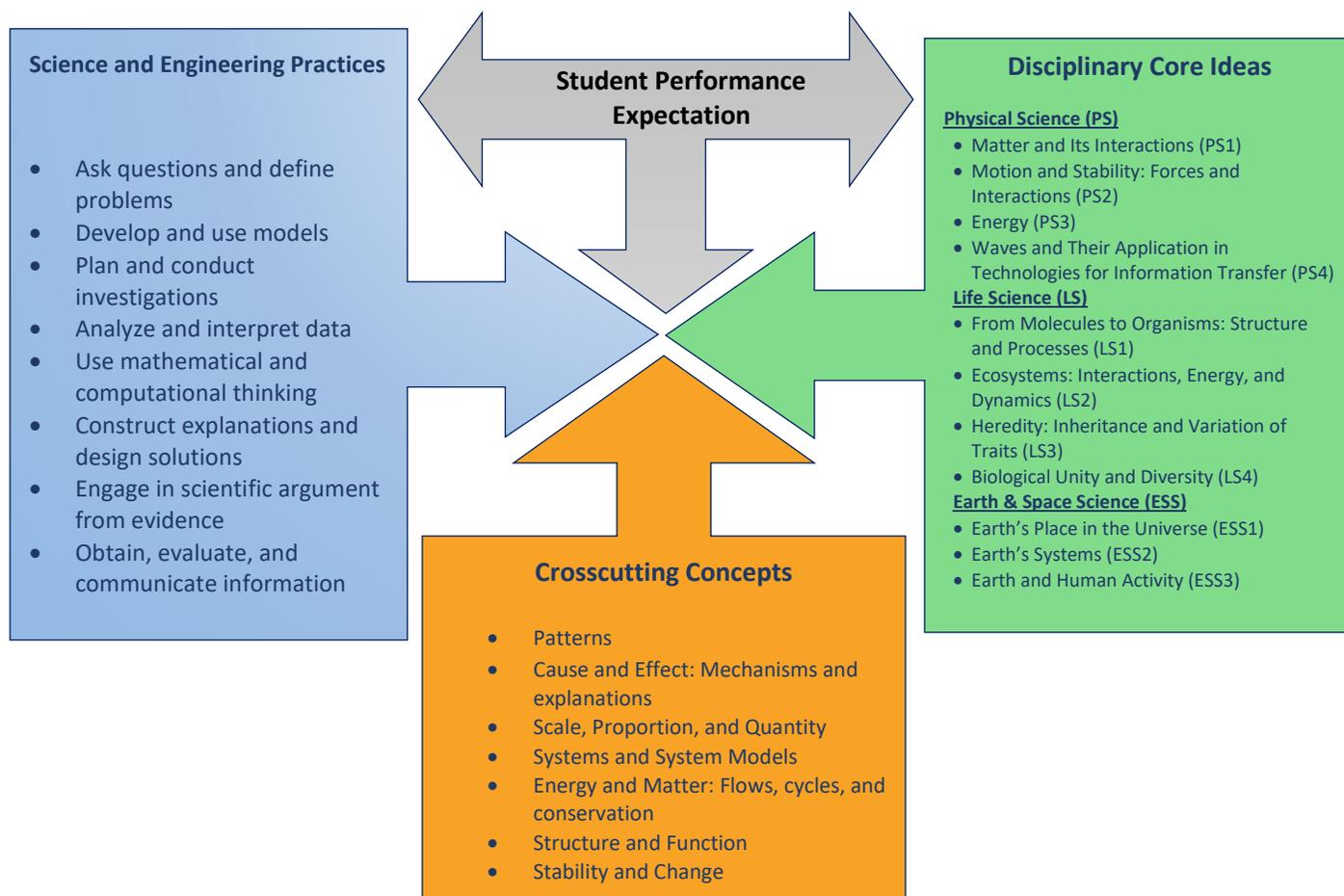
OK Teacher Collaboration
 *PLD Development may be moved to earlier process.

About OSTP Data

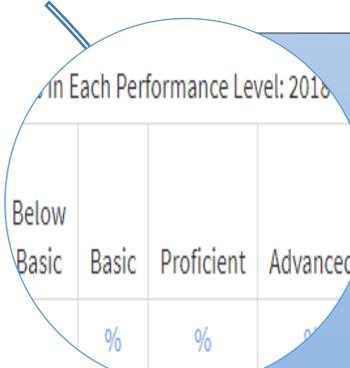
Data from the OSTP serve as a single measure of students’ knowledge, skills, and abilities of the OAS. The OSTP assessments are aligned to the standards so that teachers are able to teach the standards and do not have to “teach to the test.”

The [Oklahoma Academic Standards for Science](#) were developed and organized around three dimensions. The standards progress from grades K-12 by **setting** Performance Expectations **for** what students should know, understand, and be able to do in science.

Science Dimension	About this Dimension
Science and Engineering Practices	The Science and Engineering Practices (SEPs) describe the major practices that scientists employ as they investigate and build models and theories about the world and a key set of engineering practices that engineers use as they design and build systems. The term “practice” is used instead of the term “process” to emphasize that scientists and engineers use skill and knowledge simultaneously, not in isolation.
Disciplinary Core Ideas	The Disciplinary Core Ideas (DCIs) represent a set of science and engineering ideas for K-12 science education that have broad importance across multiple sciences or engineering disciplines; provide a key tool for understanding or investigating more complex ideas and solving problems; relate to the interests and life experiences of students; and be teachable and learnable over multiple grades at increasing levels of sophistication.
Crosscutting Concepts	The Crosscutting Concepts (CCCs) represent common threads or themes that span across science disciplines (biology, chemistry, physics, environmental science, Earth/space science) and have value to both scientists and engineers because they identify universal properties and processes found in all disciplines.

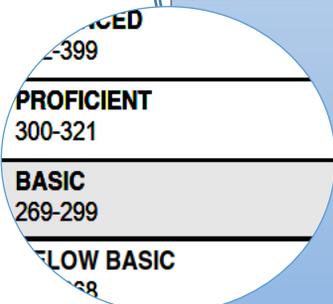


Claims made by the OSTP are reported out at three different levels: **Performance Level, Oklahoma Performance Index Score (OPI), and Reporting Category Indicator**. Data related to each claim can be used to help identify instructional and programmatic strengths and gaps.



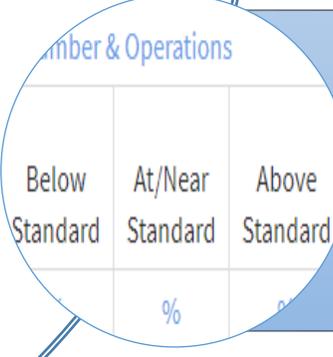
Performance Level - Are we on track?

- Reported as one of four levels: **Advanced, Proficient, Basic, or Below Basic**
- Relates what a typical student at each level should know and be able to do relative to the Oklahoma Academic Standards (OAS) as described in the Performance Level Descriptors (PLDs)
- Provides a broad view of whether a student, program, or group is on track with the grade-level expectations needed to be college- and career-ready



Oklahoma Performance Index Scores (OPI)- Are we progressing?

- Reported as a number between 200-399 where **300** is always **Proficient**
- Provides a more specific data point that can be used to measure growth from year to year and determine where a student or program is meeting grade-level expectations.



Reporting Category Indicators- Where are our strengths?

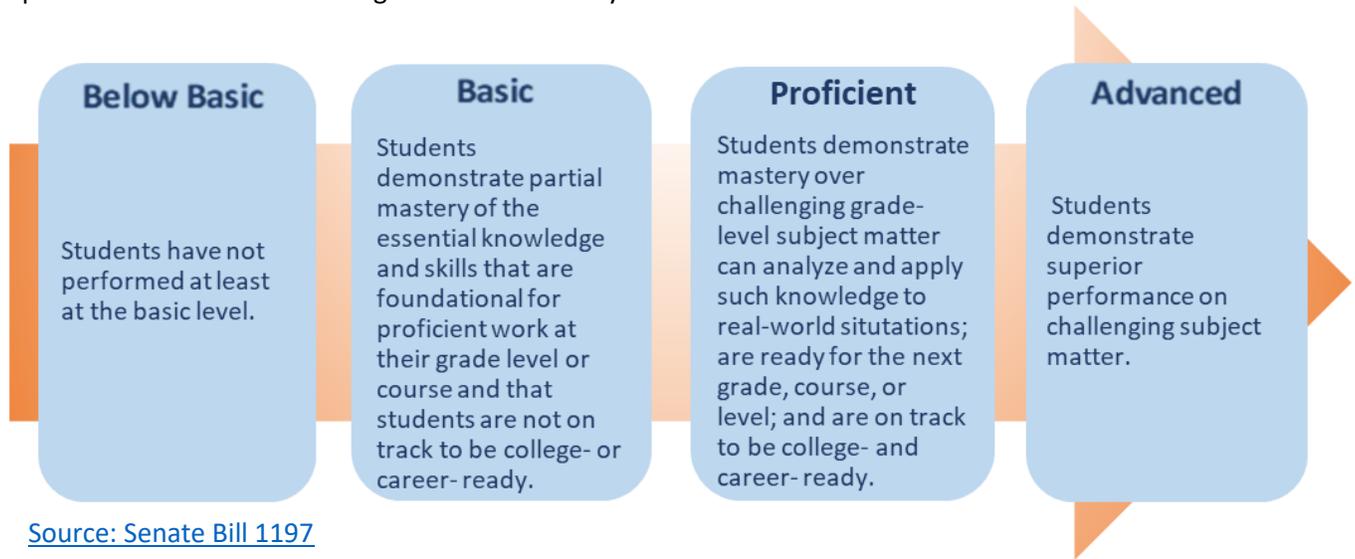
- Identified on the OSTP Test Blueprints and reported out as one of three indicators: **Above Standard, At/Near Standard, or Below Standard**
- Determined by comparing student performance on items associated with each reporting category against the expectations of Proficiency
- Provides a data point about student or program strengths and gaps

Educators can access OSTP reports through the [Measured Progress portal](#); however, a username and password are needed. Please contact your district test coordinator to find out about your school/district policy related to accessing data in the portal. In addition, the [test blueprints](#) are available on the OSDE website.

Parents can access individual student reports through the [Parent Portal](#). Your student’s State Testing Number is required to access scores; please contact your district of enrollment for this information.

OSTP Performance Level Data: Are we on Track?

Performance levels provide a broad view of whether a student, program, or group is on track with grade-level expectations needed to be college- and career-ready.



Source: [Senate Bill 1197](#)

Performance levels were determined by Oklahoma educators to identify the knowledge, skills, and abilities (KSAs) students should demonstrate based on their command of grade-level standards. The resulting Performance Level Descriptors (PLDs) and OSTP test results were used during the standard setting process to determine the “cut scores” for each performance band. The range of scores for each performance level band varies by grade as shown in the table below. The table communicates the range of index scores in each performance band and the percentage of Oklahoma students that scored at each level.

Science Performance Levels and % of OK Students Scoring at Level by Grade Level (2018-19)

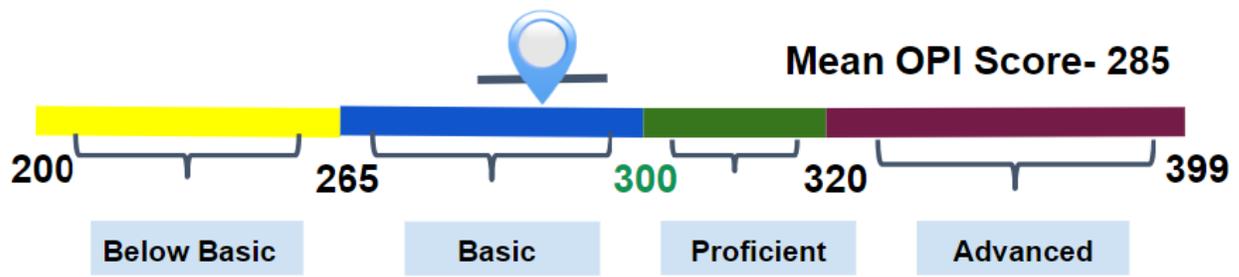
Grade	Below Basic	% at Band	Basic	% at Band	Proficient	% at Band	Advanced	% at band
5 th	200-271	22%	272-299	40%	300-329	30%	330-399	8%
8 th	200-283	39%	284-299	21%	300-327	31%	328-399	9%
11 th	200-277	57%	278-299	20%	300-326	17%	327-399	7%

Performance Level claims inform stakeholders of how to interpret student test scores in relation to the OAS through [Performance Level Descriptors](#) (PLD). PLDs define the knowledge, skills, and abilities students should demonstrate at each grade and in each Performance Level.

Oklahoma Performance Index (OPI) Scores: Are we progressing?

Oklahoma Performance Index (OPI) scores supplement performance-level data by pinpointing where a score is relative to the performance level.

Sample Science Performance Level Bands and Mean OPI



OPI scale scores allow for numerical comparison between test takers taking the same test. Because these tests are administered in consecutive years, OPI scores can also be used to track student growth in ELA and math. Score ranges differ by grade and subject area as shown in the [performance level lookup table](#).

OPI scores are obtained by converting raw scores onto a common scale and account for differences in difficulty across different assessment forms so that OPI scores are equivalent regardless of form difficulty. This allows for consistency in score interpretation.

Also referred to as an average, the mean OPI score is calculated by adding all the individual student scores and dividing by the number of total scores and communicates the average performance for a group of students.

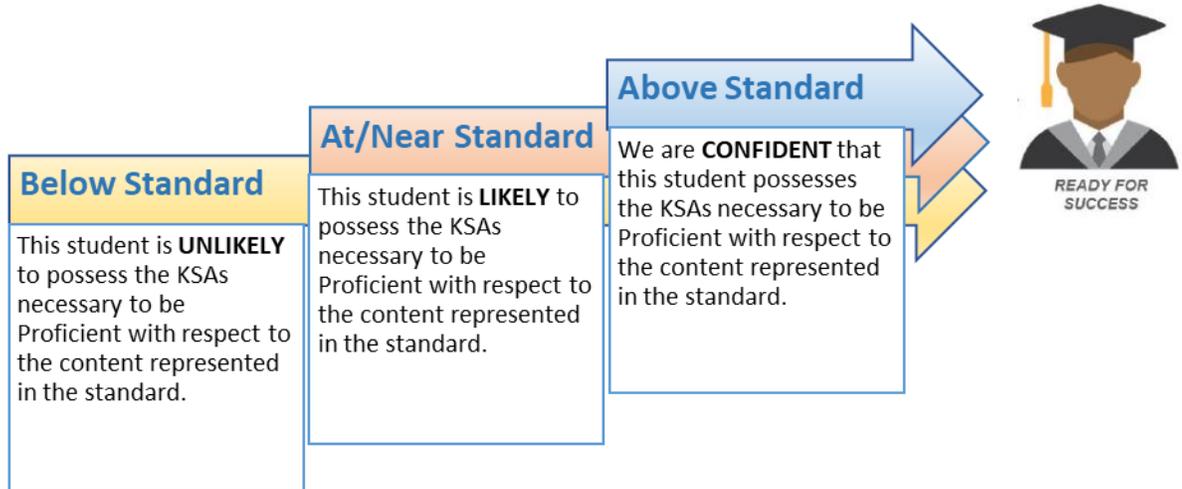
Science Mean OPI scores

Grade	2017	2018	2019
5 th	295	293	291
8 th	292	291	291
11 th	No scores for 2017 and 2018		271

OSTP Reporting Category Indicators: Where are our Strengths?

Each OSTP science assessment has three reporting categories: Physical Science, Life Science, and Earth & Space Science. Reporting categories represent groups of similar student skills assessed within each grade level and subject area. Performance is reported with an indicator that communicates a confidence level of the student's likelihood of being able to demonstrate the proficient level Knowledge, Skills, and Abilities (KSAs) found in the Performance Level Descriptor (PLD) and assessed through at least six questions. The indicators are **Below Standard**, **At/Near Standard**, and **Above Standard**.

Reporting category indicator claims have the **smallest grain size** and can provide an additional piece of evidence to inform instructional and programmatic decisions by **bringing to the surface** what is working and what may need to change relative to the standards.



2018-19 Science Reporting Categories by Grade Level and Indicator

Domain - Physical Science (PS)	5 th	8 th	11 th
➤ Below Standard	42%	44%	68%
➤ At/Near Standard	38%	28%	17%
➤ Above Standard	20%	29%	15%
Domain - Life Science (LS)	5 th	8 th	11 th
➤ Below Standard	45%	29%	63%
➤ At/Near Standard	31%	50%	21%
➤ Above Standard	24%	21%	16%
Domain - Earth and Space Science (ESS)	5 th	8 th	
➤ Below Standard	37%	48%	
➤ At/Near Standard	39%	28%	
➤ Above Standard	23%	24%	

Reporting Category Analysis: Science

Reporting Category indicator claims can best be interpreted by linking the [Oklahoma Academic Standards](#) measured on the assessment with proficient (or on track) level knowledge, skills, and abilities described in the [Performance Level Descriptors](#) (PLDs). PLDs define the intended interpretations of tests scores by describing what students should know and be able to do in each level of achievement. PLDs reflect the standards but should not be the emphasis of instruction. Additional guidance for educators can be found in the [Oklahoma Science Frameworks](#).

The Oklahoma Academic Standards for Science represent a progression from grades K-12 and it is critical that students have access to science teaching at each grade level so that they have the knowledge, skills and abilities needed to be on track and ready for the next level.

Grade 5	
<p>Physical Science</p> <p>5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.</p> <p>5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.</p> <p>5-PS1-3 Make observations and measurements to identify materials based on their properties.</p> <p>5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.</p>	<p>On Track Knowledge, Skills, and Abilities</p> <p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ apply scale, proportion, quantity, and/or patterns when performing computational thinking to data as it pertains to conservation of matter ➤ observe and measure phenomenon to identify patterns that classify materials based on properties ➤ describe cause and effect relationships when mixing substances within an investigation framework.
<p>Life Science</p> <p>5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.</p> <p>5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.</p> <p>5-LS2-2 Use models to explain factors that upset the stability of local ecosystems.</p> <p>5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.</p>	<p>On Track Knowledge, Skills, and Abilities</p> <p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ describe, use and/or develop basic models at various scales to explain the movement of matter and energy between organisms and ecosystem to explain the outcomes of these interactions. ➤ use evidence, data, and/or models to engage in argument to explain how plants use matter (chiefly air and water) to grow
<p>Earth & Space Science</p> <p>5-ESS1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.</p> <p>5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.</p> <p>5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.</p> <p>5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</p> <p>5-PS2-1 Support an argument that the gravitational force exerted by the Earth is directed down.</p>	<p>On Track Knowledge, Skills, and Abilities</p> <p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ describe, use and/or develop basic models at various scales to explain the movement of matter and energy between Earth's systems and to explain the outcomes of these interactions. ➤ apply scale, proportion, quantity, and/or patterns when performing computational thinking to data as it pertains to distribution of water on Earth and Earth's relationship with the sun, moon, and stars ➤ use evidence, data, and/or models to engage in argument to explain the cause and effect relationships between an object and Earth's gravity, ➤ use evidence, data, and/or models to engage in argument as to how scale and proportion affect the apparent brightness of the sun and other stars

Grade 8

Physical Science	On Track Knowledge, Skills, and Abilities
<p>MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.</p> <p>MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.</p> <p>MS-PS2-1 Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p>MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.</p> <p>MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p> <p>MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p>	<p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ make predictions about, describe, develop, or use a given model involving conservation of matter in chemical reactions ➤ use patterns make predictions about, describe, develop, or use a given model about the structure and function of waves ➤ identify, describe, or explain how to plan or perform investigations about stability and change of forces and motion ➤ use, describe, or explain a design solution, or identify evidence of relationships within a design solution in various systems involving energy transfer in chemical reactions or forces in collisions
Life Science	On Track Knowledge, Skills, and Abilities
<p>MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.</p> <p>MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.</p> <p>MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer ancestral relationships.</p>	<p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ use, describe, explain, or identify evidence of relationships in various systems involving energy transfer ➤ analyze data to identify and apply patterns in data about common ancestry, the diversity of organisms, and the geologic history of Earth ➤ construct explanations by identifying, describing, or comparing patterns in evidence of anatomy and common ancestry of organisms
Earth & Space Science	On Track Knowledge, Skills, and Abilities
<p>MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s geologic history.</p> <p>MS-ESS2-1 Develop a model to describe the cycling of Earth’s materials and the flow of energy that drives this process.</p> <p>MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales.</p> <p>MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.</p> <p>MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.</p> <p>MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.</p> <p>MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth’s systems</p>	<p>Students receiving At/Near or Above Standard indicators are likely to be able to</p> <ul style="list-style-type: none"> ➤ make predictions about, describe, develop, or use a given model involving stability and change at varying scales in Earth’s systems ➤ identify and apply patterns in data about the geologic history of Earth, or natural hazards to explain cause and effect relationships ➤ use the concept of patterns in cause and effect relationships or the concept of scale and proportion to construct explanations by identifying, describing, or comparing evidence or aspects of Earth systems including geologic history, materials and processes, natural resources or human impacts on those systems

Next Steps

As with all OSTP data, other relevant information such as student work samples and local level standards-based assessments should be considered when making programmatic or student-level decisions.

State, District, Site, and Teacher Level Insights

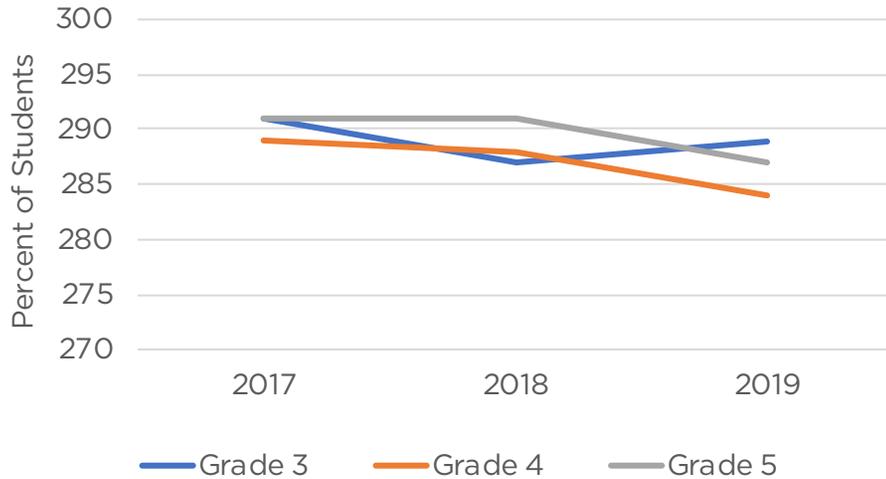
How OSTP Performance Levels Can Be Used	How Oklahoma Performance Index (OPI) Scores Can Be Used	How OSTP Reporting Category Indicators Can Be Used
To see where students are as a whole	To identify changes in achievement gaps over time and track changes in student growth from year to year	To identify where strengths and gaps may exist in the curriculum
To determine equity gaps across student groups	To determine equity gaps across student groups	To determine equity gaps across student groups
To identify patterns or trends across student groups and/or grade levels	To identify patterns or trends across student groups and/or grade levels	To evaluate effectiveness of differentiation
To evaluate vertical alignment across grade levels and horizontal alignment across teachers or student groups	To evaluate alignment across grade levels	To evaluate alignment across grade levels
To compare your district to the state and to compare local formative and/or interim assessments and other evidence of student learning	To compare your district to the state and to other districts and clarify relationship between test data to local level evidence of learning	To compare your district to the state and to other districts

Student Level Considerations

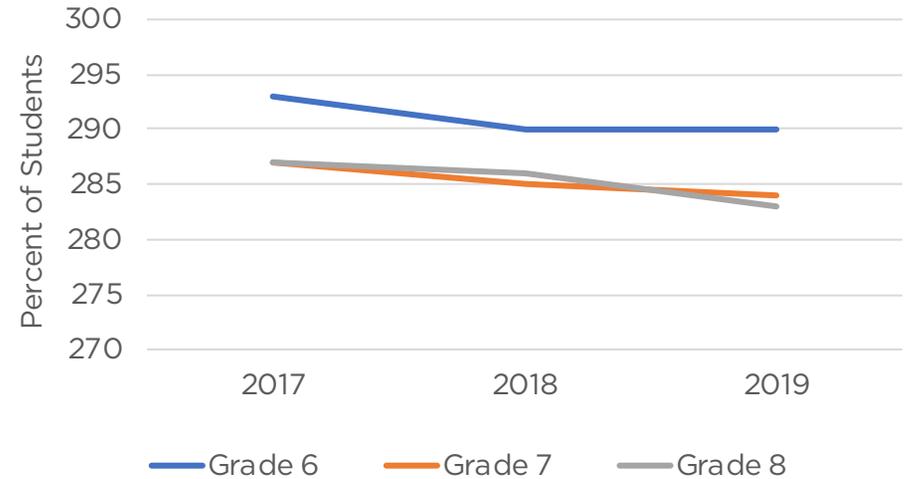
Performance level data tells only part of the student’s story and other relevant information should be considered when making student level decisions. Other relevant information includes:

- Student work samples
- Course grades
- Teacher observations

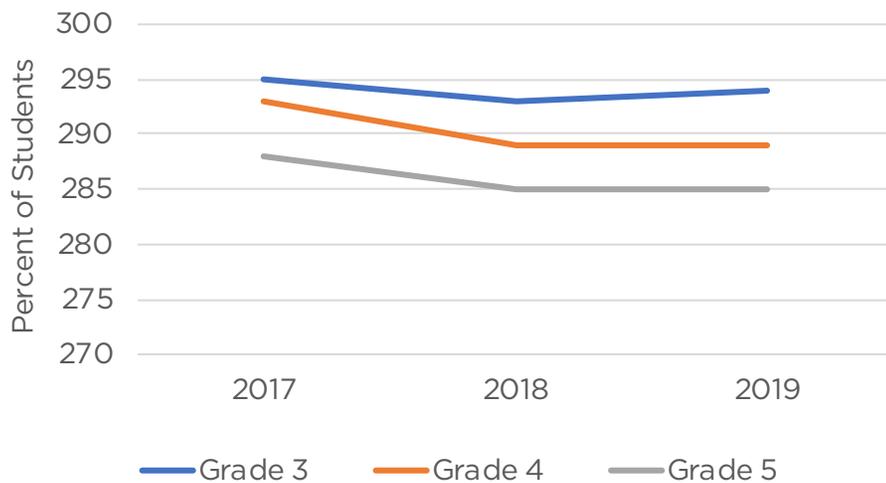
Grades 3-5 ELA Mean OPI



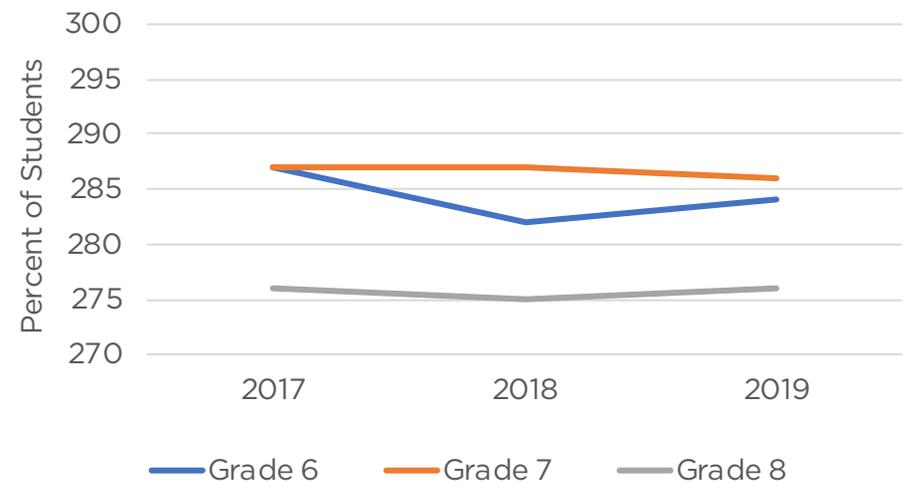
Grades 6-8 ELA Mean OPI



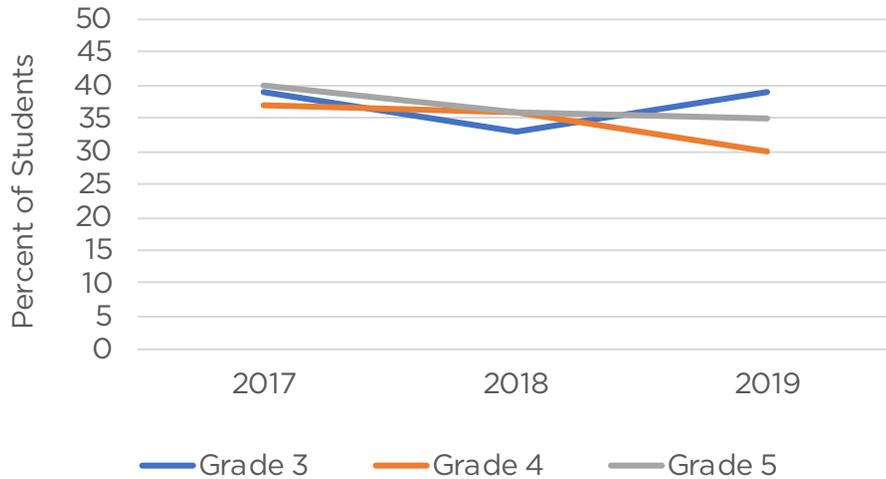
Grades 3-5 Math Mean OPI



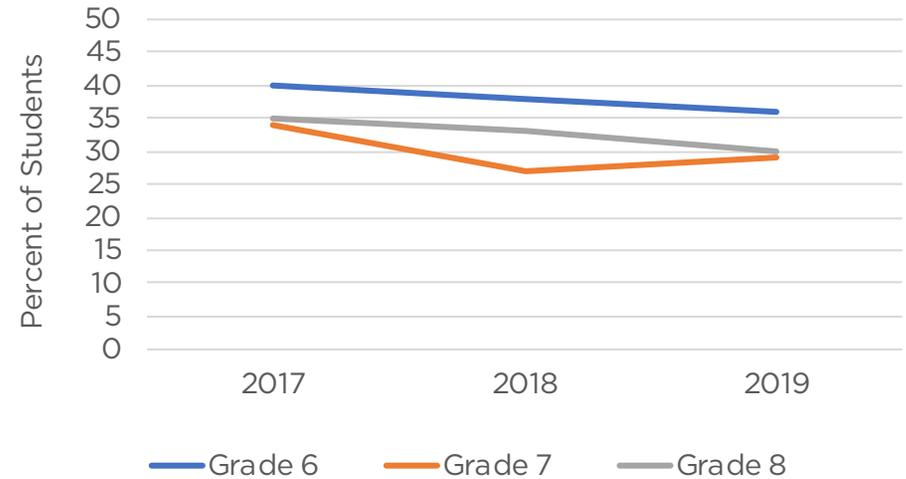
Grades 6-8 Math Mean OPI



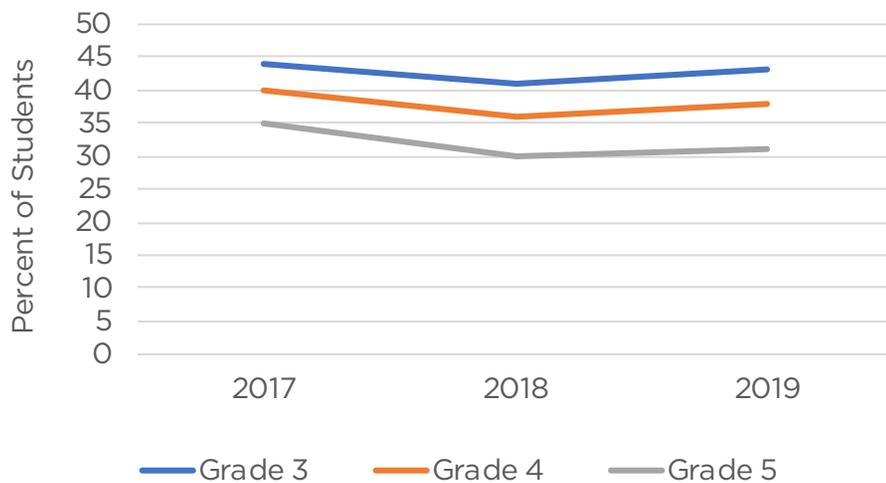
Grades 3-5 ELA Percent Proficient & Above



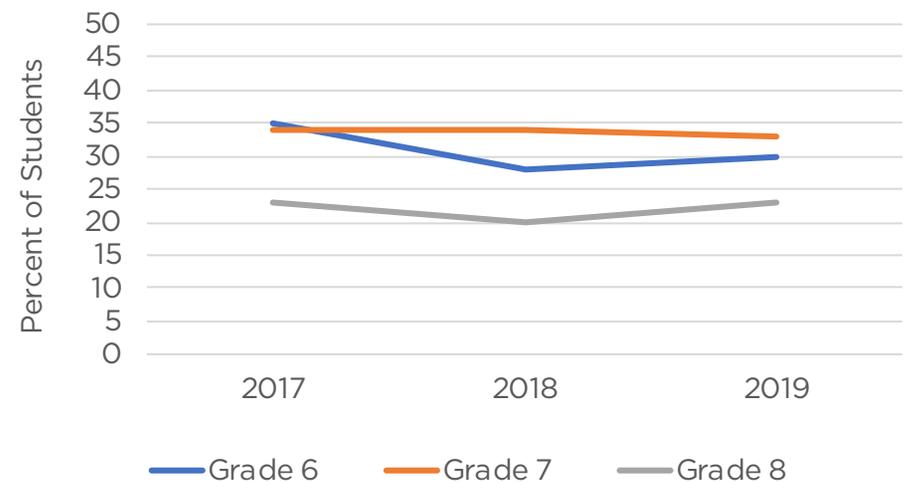
Grades 6-8 ELA Percent Proficient & Above



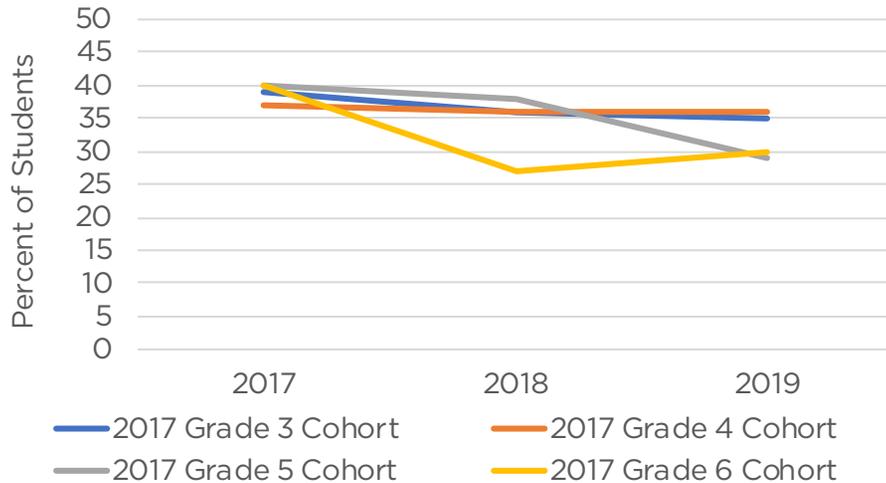
Grades 3-5 Math Percent Proficient & Above



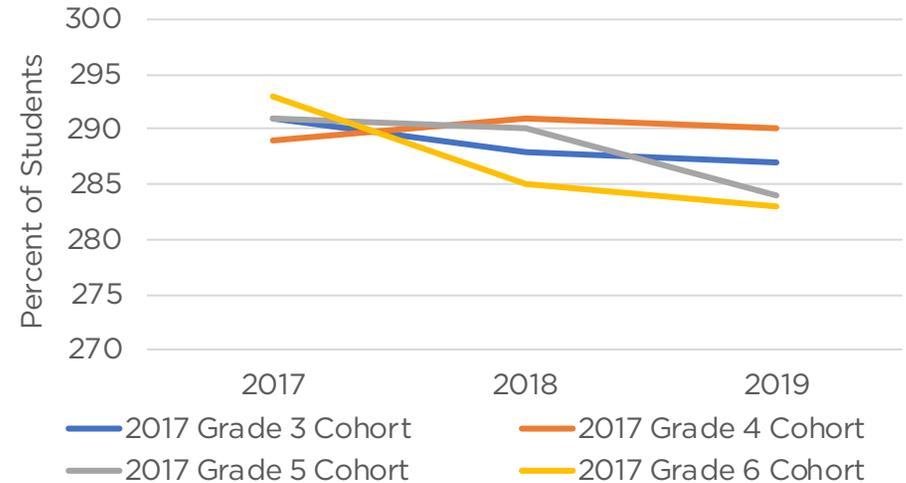
Grades 6-8 Math Percent Proficient & Above



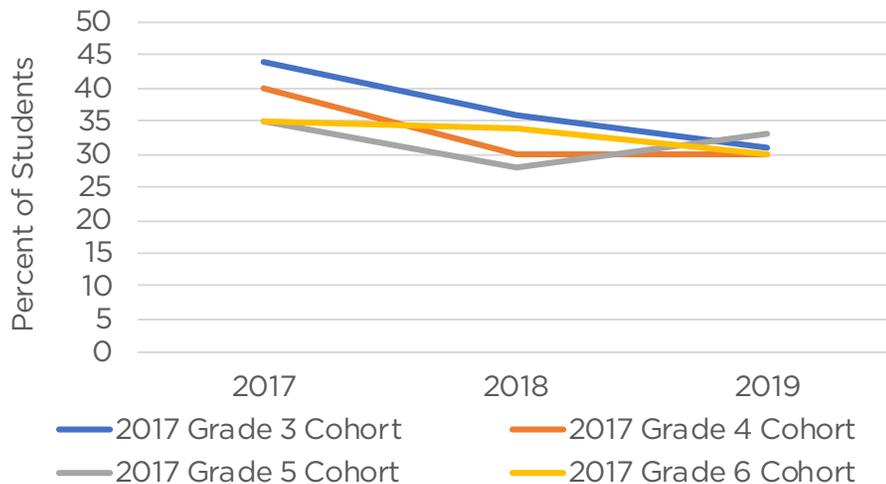
ELA Percent Proficient Cohort Trend



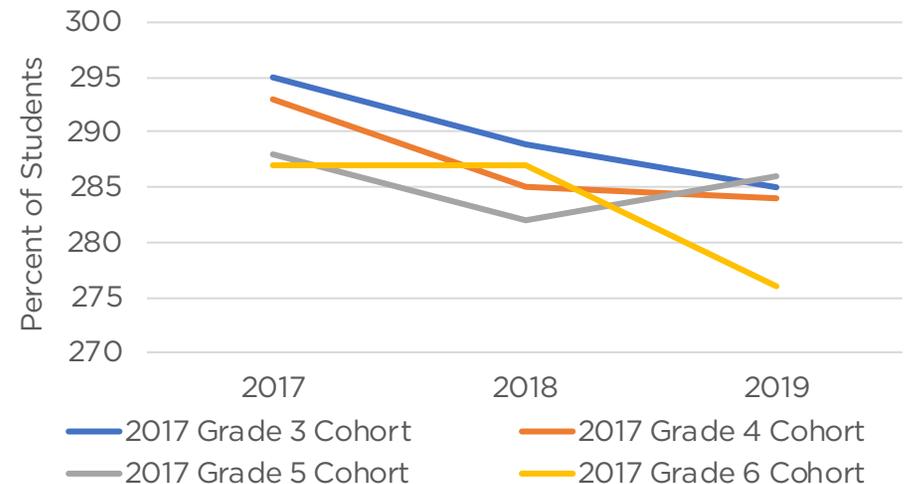
ELA Mean OPI Cohort Trend



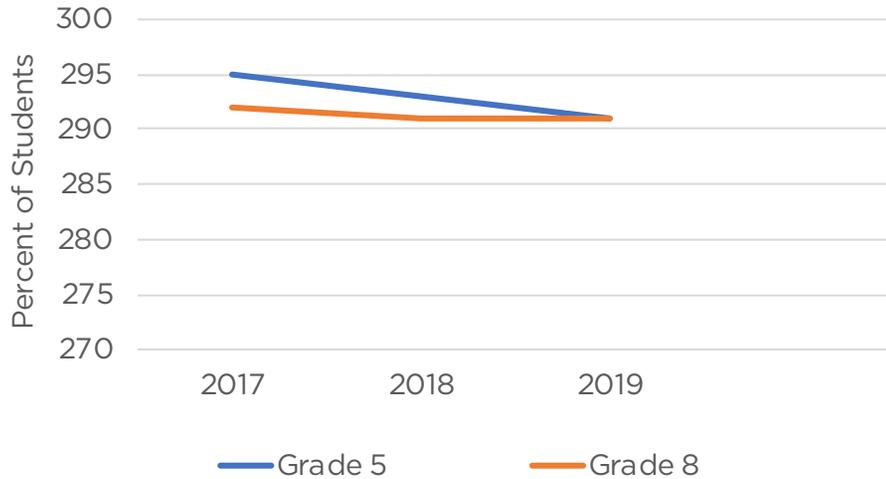
Math Percent Proficient Cohort Trend



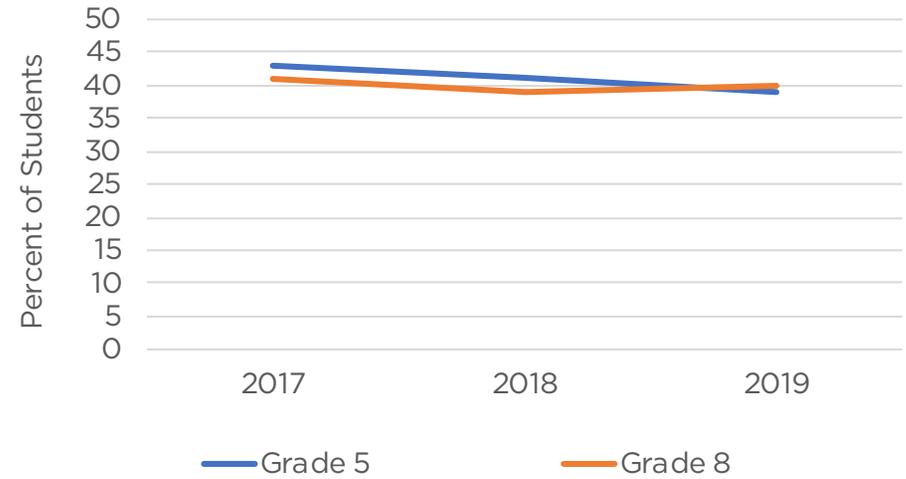
Math Mean OPI Cohort Trend



Science Mean OPI



Grades 5 Science Percent Proficient & Above



DEFINED TERMS:

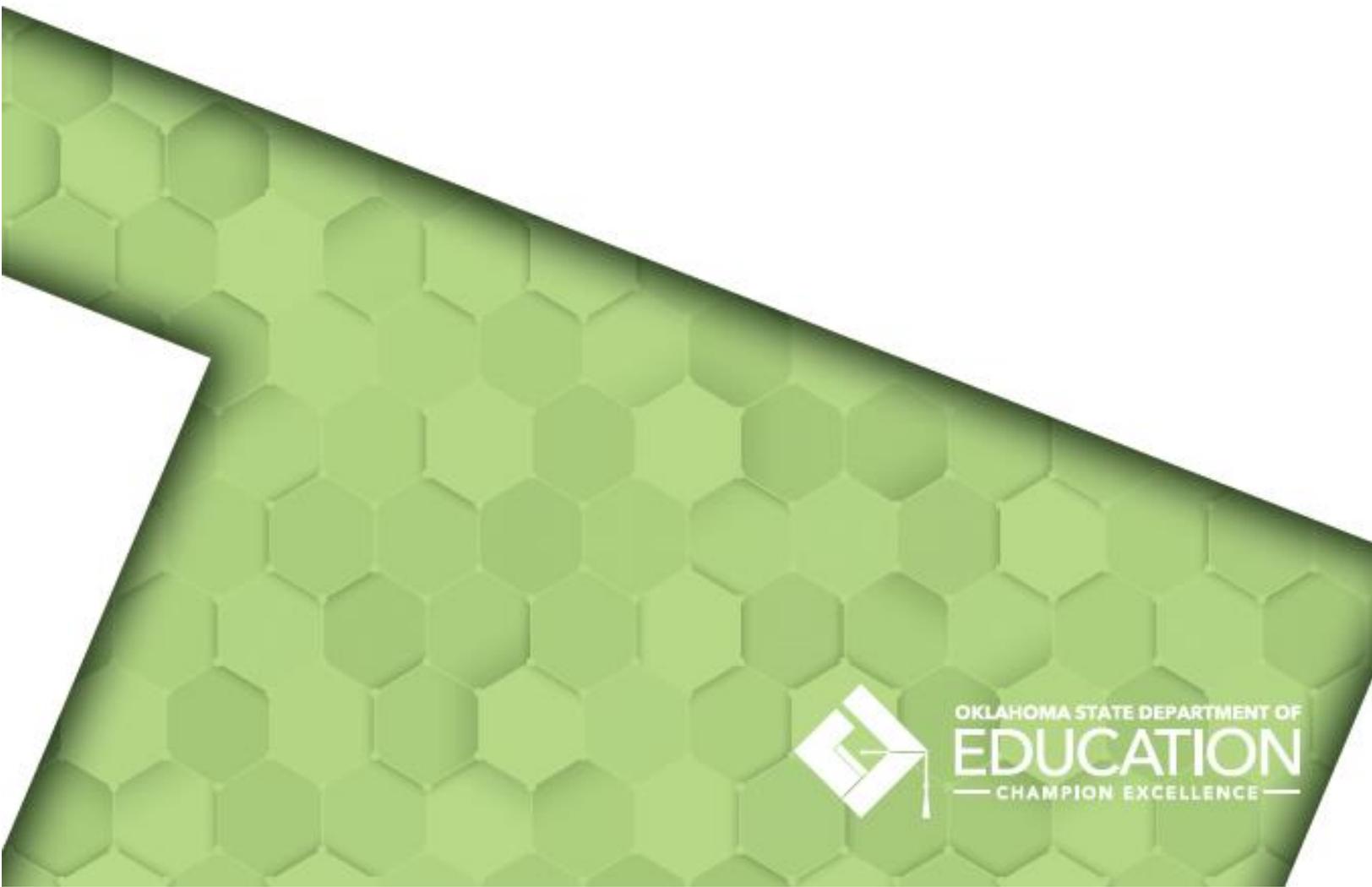
OPI - The OSTP scaled score between 200 and 399

Mean OPI - Average OPI score

Percent Proficient and Above - Percentage of students who received an OPI score of 300 or above

ELA - English Language Arts

Cohort - A group of students tracked over multiple years



OKLAHOMA STATE DEPARTMENT OF
EDUCATION
— CHAMPION EXCELLENCE —