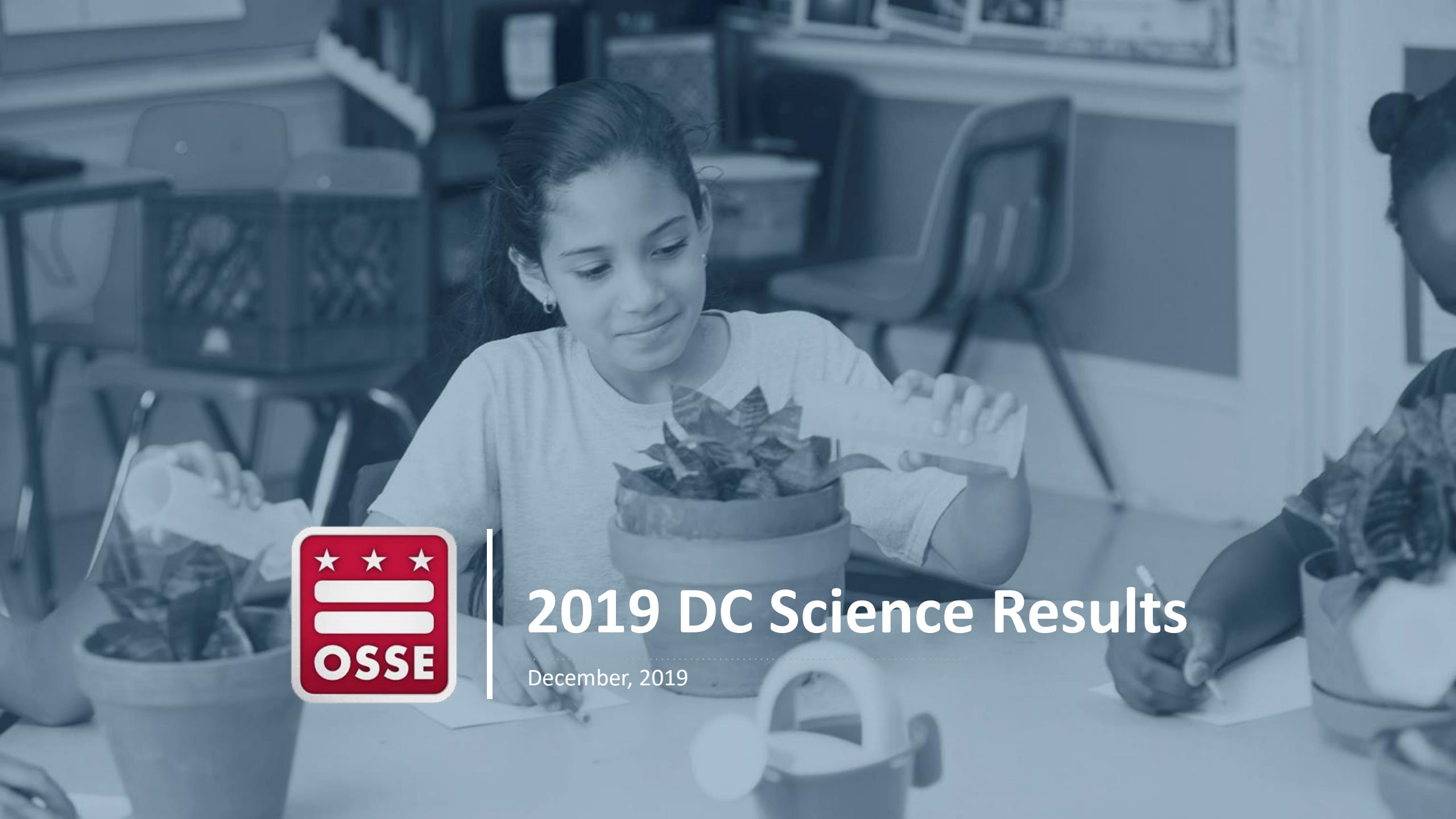


2019 DC Science Results

December, 2019

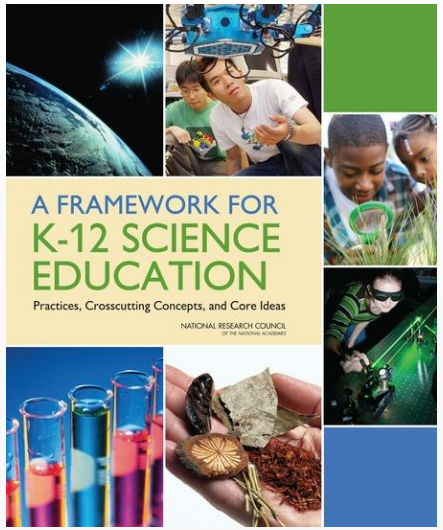
Background

- The District administered a new statewide science assessment which measures the Next Generation Science Standards (NGSS) in spring 2019
- Required assessments include:
  - Grade 5 Science
  - Grade 8 Science
  - High School Biology
- OSSE is releasing statewide results, which include District of Columbia Public Schools and public charter schools

States Across the Nation have Raised Expectations

- Forty-three states and DC (representing 71% of U.S. students) have education standards based on the *Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas and/or the Next Generation Science Standards (NGSS)*

- DC adopted the NGSS in December 2013.



NEXT GENERATION SCIENCE STANDARDS

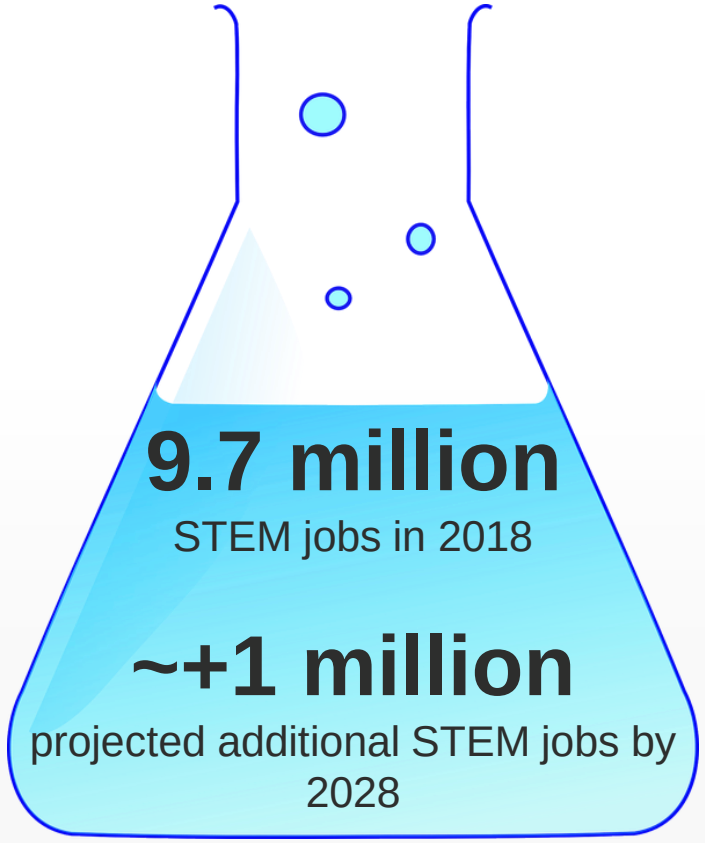
OSSE

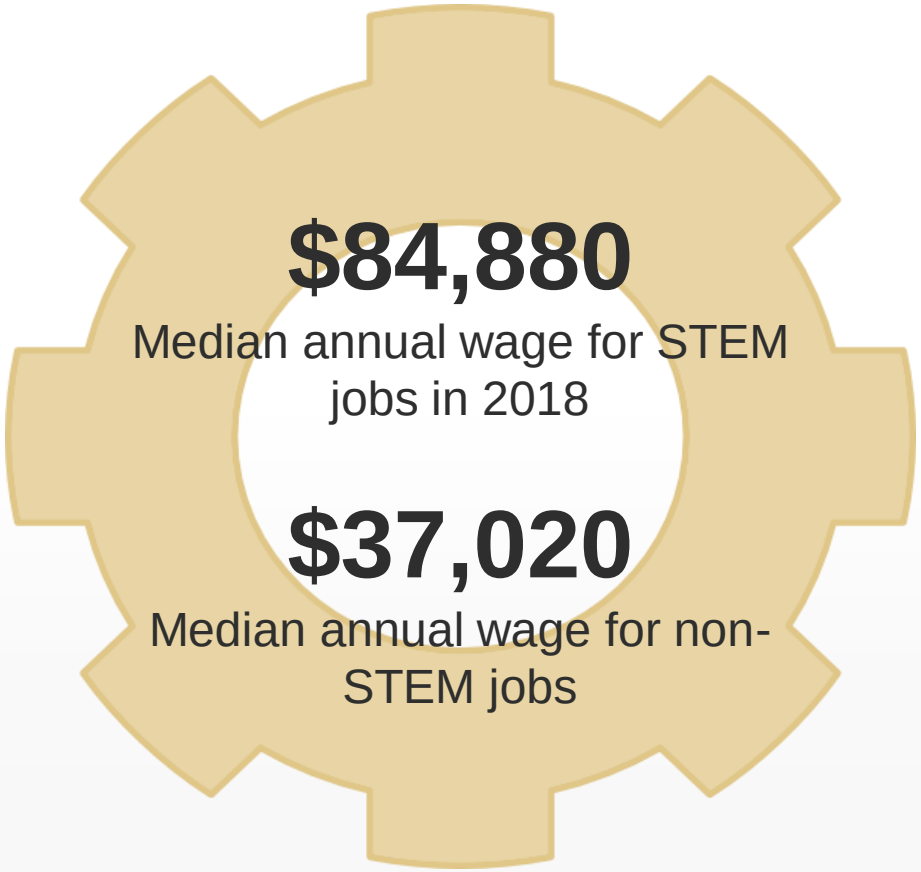
NGSS and Readiness for 21st Century Careers

- The NGSS identify scientific and engineering practices, cross-cutting concepts, and core ideas in science that all K-12 students should master to be prepared for success in college and 21st century careers
- By adopting these standards, the District set a high bar for science performance that reflects the needs of a changing career landscape
- New, challenging expectations set by standards and assessments necessitate shifts in instruction and in support for schools and students
- OSSE is committed to supporting LEAs and schools as they continue the transition to the NGSS by providing targeted professional development opportunities

Readiness for 21st Century Careers

The shift in DC's science standards and assessments reflect a shift in the national landscape of STEM related careers. As of 2018, there were almost 10 million careers in STEM, and the number continues to grow.





Citation: U.S. Department of Labor Bureau of Labor Statistics Employment Projections

DC Science Educator Panelist Reflections

Reflections from DC science educators who participated in DC Science development:

“The Next Generation Science Standards (NGSS) set a high bar for science instruction that all students deserve.”

“Transitioning to the Next Generation Science Standards (NGSS) for science instruction has truly helped to transform the way in which our students learn science and how we teach science.”

“The greatest need in science education within the DC community is an appreciation for science education overall…”

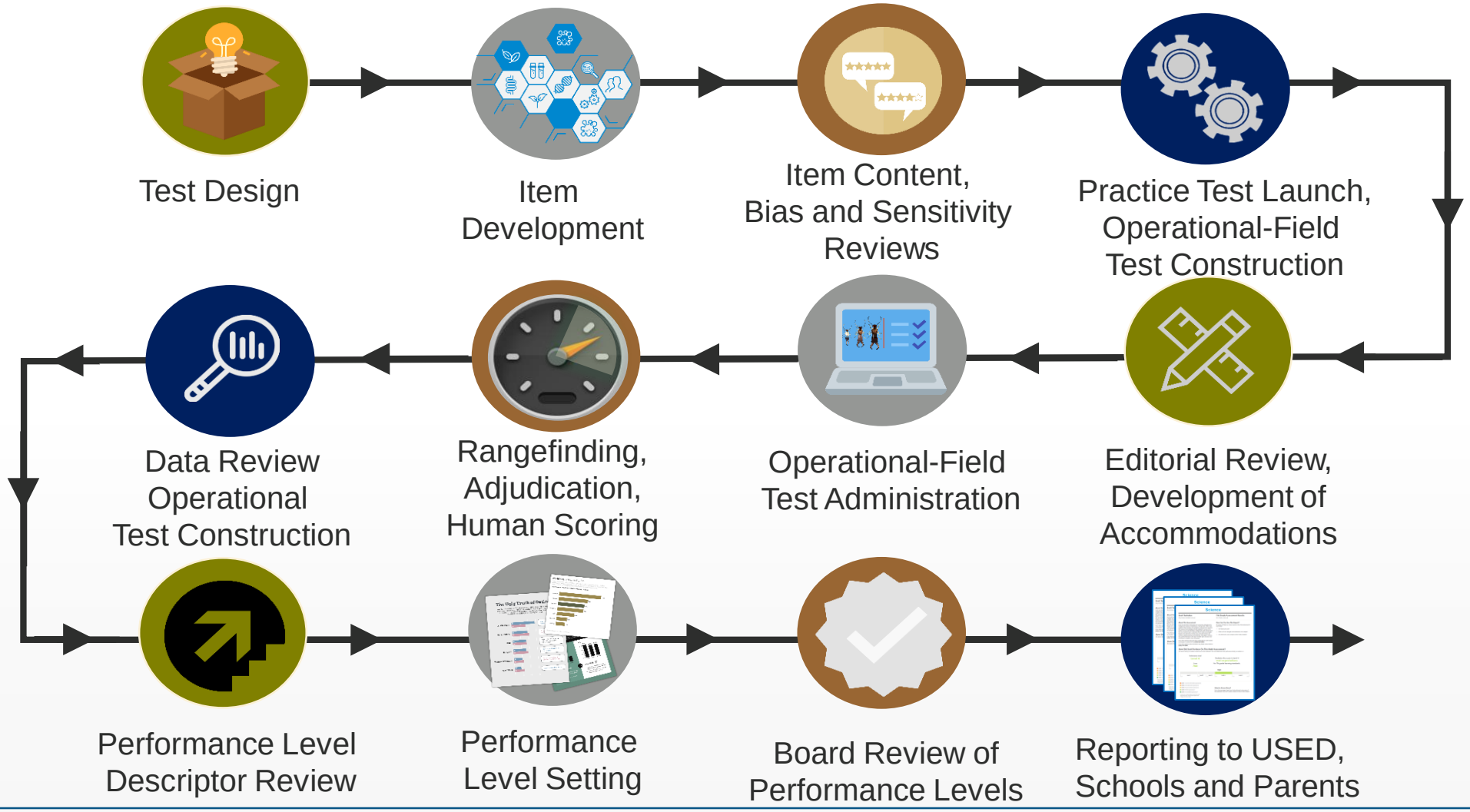
“(Science) does not receive the same amount of attention other courses have such as math and ELA.”

“Teachers need quality curricular resources that align to the standards.”

Assessments Designed for DC by DC

- The DC Science Assessment was developed for DC by DC
- OSSE partnered with DC science educators in every stage of the DC Science Assessment development process:
    - Assessment design
    - Reporting priorities
    - Item development
    - Bias and sensitivity review
    - Setting scoring parameters
    - Performance level descriptor review
    - Performance level setting

Developing a New Science Assessment



Transitioning from DC CAS to DC Science

The item below is taken from a Grade 5 DC CAS Science assessment that measured the District's legacy life science standards.

Grade 5 DC CAS Science Item

Which of these characteristics is <u>least</u> likely to be passed on to a puppy from its parents?

F the color of its fur
G the color of its eyes
H how many teeth it has
J how many times it barks a day

DC CAS Standard: 5.11.2 List some characteristics of plants and animals that are fully inherited (e.g., form of flower, shape of leaves) and others that are affected by the climate or environmental conditions (e.g., browning of leaves from too much sun, language spoken)

Transitioning from DC CAS to DC Science

The item below is taken from the Grade 5 DC Science Practice Test which measures the NGSS. Note the significant change in the rigor of the standard and its expectations.

Grade 5 DC Science Assessment Item

Figure 1 | Table 1

A class goes on a school trip to learn about the types of organisms that live in a local river. They work in groups and use nets to collect organisms out of the river. One group captures water striders and dragonflies (Figure 1). They make a data table to compare the traits of the water striders and dragonflies (Table 1).

Figure 1. Reproductive Cycles

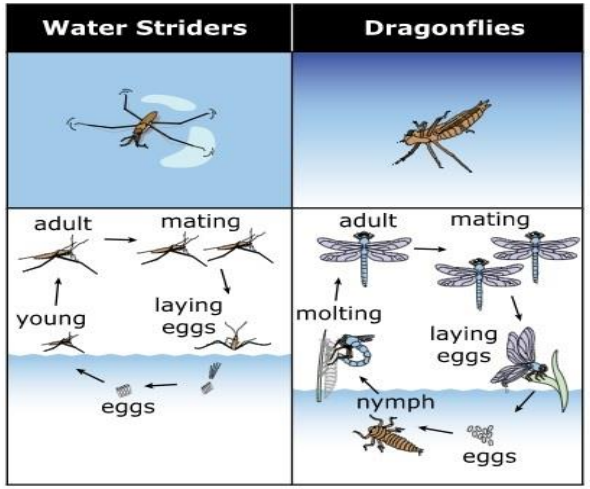


Figure 1 | Table 1

Table 1. Water Strider and Dragonfly Traits

Characteristic	Water Strider	Dragonfly
Body parts	6 thin legs that trap air bubbles with tiny hairs	6 thin legs and short antennae
Behavior	gather in swarms for feeding and mating; move rapidly on the surface of the water to catch insects for food	gather in swarms for feeding; catch insects for food
Appearance of adults	some have wings and some do not	adult form is brightly colored and has 2 sets of wings
Environment	can live in freshwater or saltwater	found only in freshwater and migrate when weather grows cold
Appearance of young	young look like smaller versions of adults	nymph has gills and short antennae

A dragonfly has laid eggs in the water by the edge of the river. Use Table 1 to determine which traits the nymphs will have in common with the parents after the eggs hatch.

Select **two** correct answers.

- A. 6 legs
- B. 2 sets of wings
- C. ability to migrate
- D. bright-colored body
- E. antennae to sense movement

NGSS: 3-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms.

DC Science Performance Levels

Met or exceeded expectations of the NGSS for the grade/course

DC Science Performance Levels	
Level 4	Exceeded Expectations
Level 3	Met Expectations
Level 2	Approached Expectations
Level 1	Partially Met Expectations

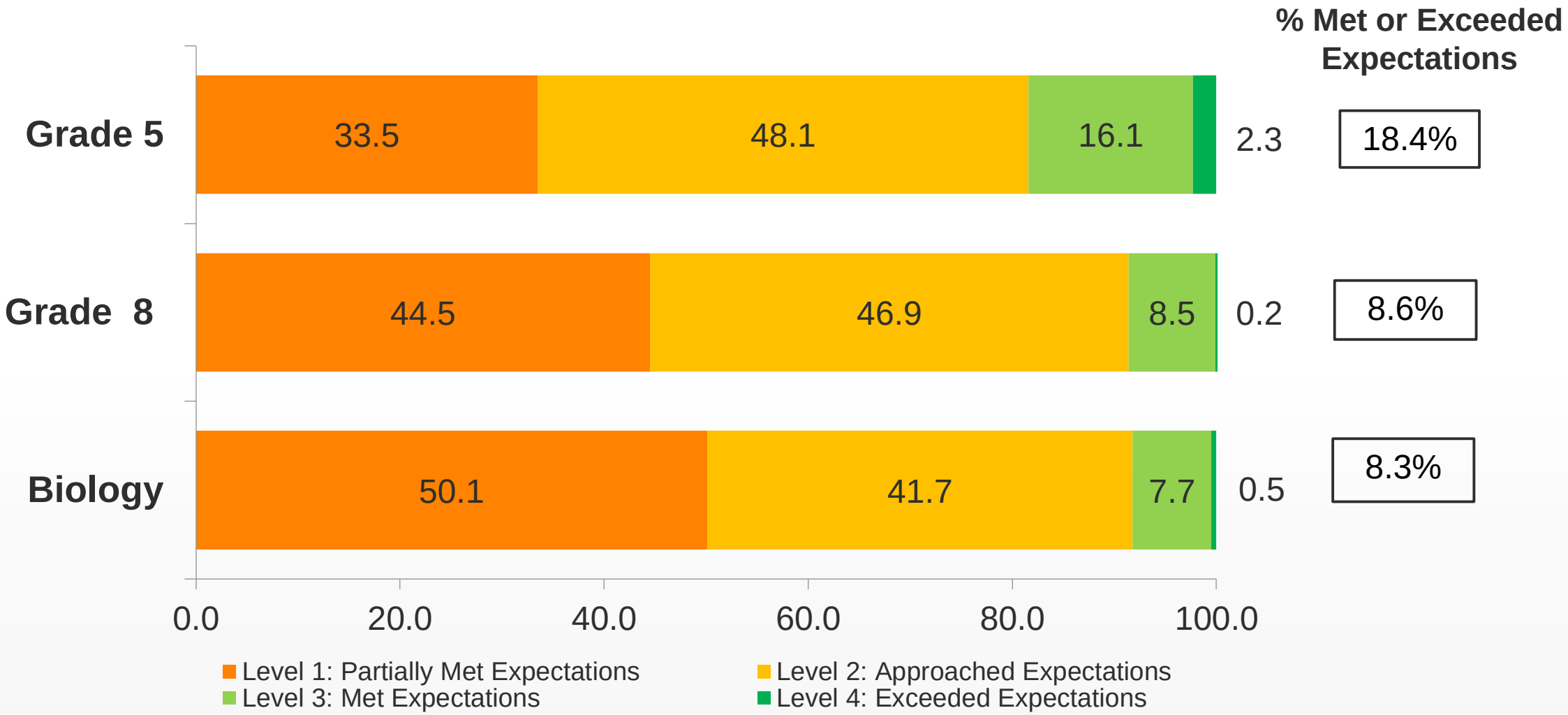
Note: The DC Science Assessment is scored on a scale of 300-600.

Results

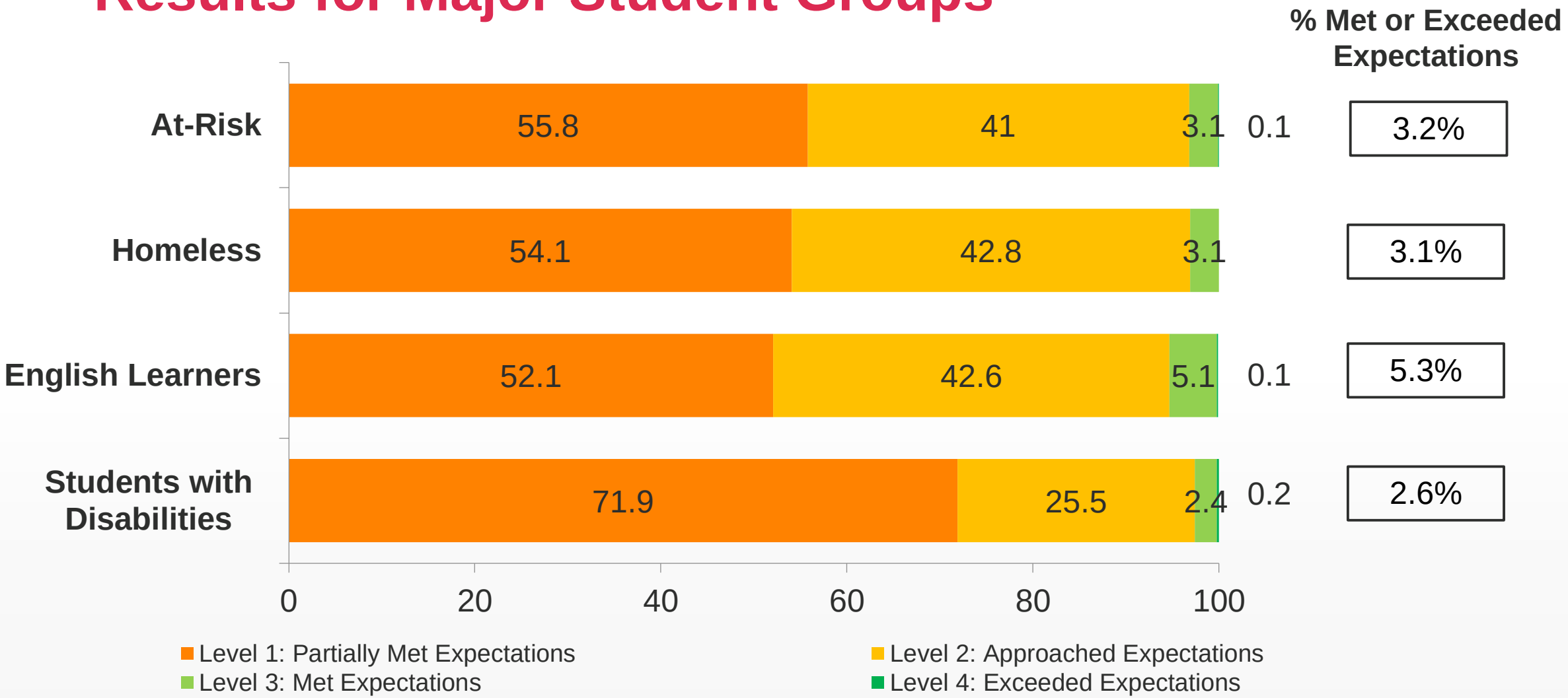
Setting a New Baseline

- DC Science measures scientific knowledge and skills most critical in the NGSS, such as scientific thinking and problem-solving
- This first year establishes a new performance baseline and sets clear expectations for our statewide science standards
- Given the new rigorous expectations, results on DC Science are lower than the results for our English language arts and math assessments this year
- We are confident that over time our results will improve, just as we have seen steady improvements in English language arts and math
- OSSE, LEAs, and schools will use results from DC Science to inform planning and support students

2019 State Results for DC Science

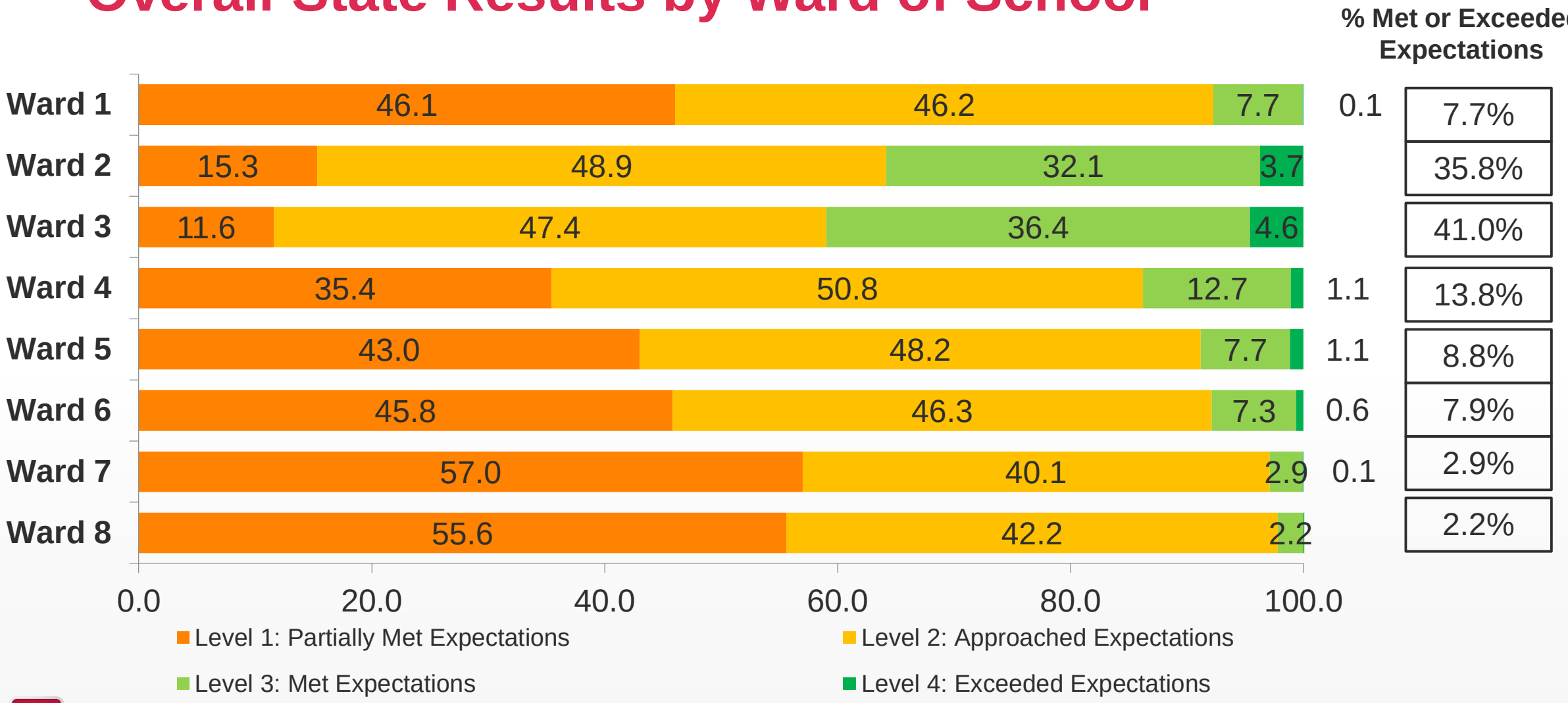


Results for Major Student Groups



Results by Race/Ethnicity

Overall State Results by Ward of School



Results Resources

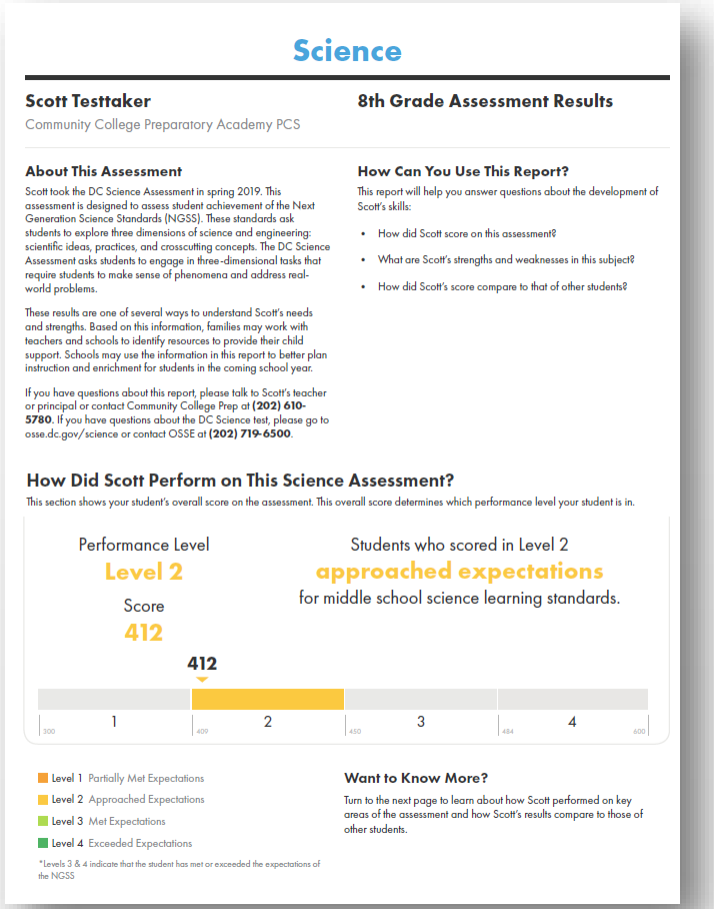
DC Science Assessment Resources

- Available the Day of the Release
  - DC Science Results Overview PowerPoint Presentation
  - School and LEA results posted to osse.dc.gov/science
  - Sample individual student reports and parent guide, including translations
  - Student results available to LEAs and schools
  - DC Science results posted on the DC Report Card at dcschoolreportcard.org

- December
  - Schools begin delivering individual student reports to parents and families

Supports for Families

Families will receive score reports in December



Science

Scott Testtaker
Community College Preparatory Academy PCS

8th Grade Assessment Results

About This Assessment

Scott took the DC Science Assessment in spring 2019. This assessment is designed to assess student achievement of the Next Generation Science Standards (NGSS). These standards ask students to explore three dimensions of science and engineering: scientific ideas, practices, and crosscutting concepts. The DC Science Assessment asks students to engage in three-dimensional tasks that require students to make sense of phenomena and address real-world problems.

These results are one of several ways to understand Scott's needs and strengths. Based on this information, families may work with teachers and schools to identify resources to provide their child support. Schools may use the information in this report to better plan instruction and enrichment for students in the coming school year.

If you have questions about this report, please talk to Scott's teacher or principal or contact Community College Prep at **(202) 610-5780**. If you have questions about the DC Science test, please go to osse.dc.gov/science or contact OSSE at **(202) 719-6500**.

How Can You Use This Report?

This report will help you answer questions about the development of Scott's skills:

- How did Scott score on this assessment?
- What are Scott's strengths and weaknesses in this subject?
- How did Scott's score compare to that of other students?

How Did Scott Perform on This Science Assessment?

This section shows your student's overall score on the assessment. This overall score determines which performance level your student is in.

Performance Level
Level 2
Score
412

Students who scored in Level 2
approached expectations
for middle school science learning standards.

412

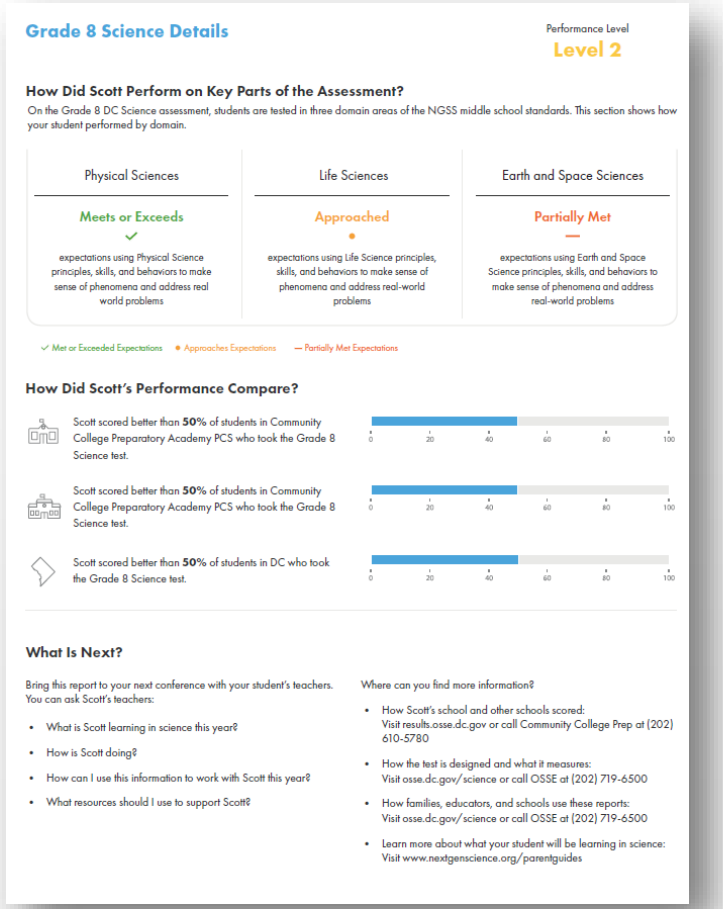
1 (300) | 2 (409) | 3 (450) | 4 (484–600)

- Level 1 Partially Met Expectations
- Level 2 Approached Expectations
- Level 3 Met Expectations
- Level 4 Exceeded Expectations

*Levels 3 & 4 indicate that the student has met or exceeded the expectations of the NGSS

Want to Know More?

Turn to the next page to learn about how Scott performed on key areas of the assessment and how Scott's results compare to those of other students.



Grade 8 Science Details

Performance Level
Level 2

How Did Scott Perform on Key Parts of the Assessment?

On the Grade 8 DC Science assessment, students are tested in three domain areas of the NGSS middle school standards. This section shows how your student performed by domain.

Physical Sciences	Life Sciences	Earth and Space Sciences
Meets or Exceeds ✓	**Approached** •	**Partially Met** —
expectations using Physical Science principles, skills, and behaviors to make sense of phenomena and address real world problems	expectations using Life Science principles, skills, and behaviors to make sense of phenomena and address real-world problems	expectations using Earth and Space Science principles, skills, and behaviors to make sense of phenomena and address real-world problems

✓ Met or Exceeded Expectations • Approaches Expectations — Partially Met Expectations

How Did Scott's Performance Compare?

Scott scored better than **50%** of students in Community College Preparatory Academy PCS who took the Grade 8 Science test.

Scott scored better than **50%** of students in Community College Preparatory Academy PCS who took the Grade 8 Science test.

Scott scored better than **50%** of students in DC who took the Grade 8 Science test.

0 | 20 | 40 | 60 | 80 | 100

What Is Next?

Bring this report to your next conference with your student's teachers. You can ask Scott's teachers:

- What is Scott learning in science this year?
- How is Scott doing?
- How can I use this information to work with Scott this year?
- What resources should I use to support Scott?

Where can you find more information?

- How Scott's school and other schools scored: Visit results.osse.dc.gov or call Community College Prep at (202) 610-5780
- How the test is designed and what it measures: Visit osse.dc.gov/science or call OSSE at (202) 719-6500
- How families, educators, and schools use these reports: Visit osse.dc.gov/science or call OSSE at (202) 719-6500
- Learn more about what your student will be learning in science: Visit www.nextgenscience.org/parentguides

NGSS Professional Learning & Instructional Supports

NGSS Standards and Instruction Resources

- Explore the Next Generation Science Standards
- Read portions of the NRC Framework for K-12 Science Education online for free. It is the detailed vision behind NGSS.
- Watch this video on the NGSS, another one on why NGSS?
- Join the #NGSSchat twitter community.
- Explore NGSS@NSTA resources designed to support teachers with NGSS, including a series of webinars.

OSSE's Division of Teaching & Learning and Science

- Since the adoption of the NGSS, OSSE has supported implementation of the standards through a variety of development opportunities, including:
  - Webinars
  - Half and one day sessions
  - Onsite technical assistance
  - Cohort-based programming
- OSSE strives to strengthen the science and STEM educational pipeline by providing support for content, instructional shifts, and translational competencies in Pre-k to grade 12.
- For more information, head to the OSSE NGSS Standards Page

OSSE's NGSS Implementation Support

- Science Teacher Leader Cohort
  - Outstanding K-12 teacher leaders provide critical guidance and feedback on the implementation of standards-based instruction, educator career pathways, intervention supports for struggling learners, and assessment development
- OSSE Science LEA Consortium (Achieve) Webinars:
  - February 20, 2020 5:30-6:30 p.m.
  - March 26, 2020, 5:30-6:30 p.m.
  - May 7, 2020, 5:30-6:30 p.m.
- DC NGSS Summit: Equity & Success for All Students
  - January 27, 2020

OSSE Teaching & Learning Professional Development

OSSE Teaching and Learning Professional Development	Date(s)
TGR Foundation Creating Inquiry Minded Environments	Jan 11, 2020
An Introduction to the Next Generation Science Standards Webinar	Jan. 14, 2020, Jan 17, 2020, April 7, 2020, April 10, 2020
DC Secondary STEM Fair/TGR Educator PD	March 14, 2020
Deepening Reading Comprehension through STEM for Middle School Educators	March 30, 2020
The Inclusive Science Classroom: Supporting All Learners	April 2020
DC Elementary STEM Fair/TGR Educator PD	May 30, 2020
Deepening Reading Comprehension through STEM for Middle School Educators	June 5, 2020
NASM Early Engineering with Structures	June 2020
Supporting Learning with Tools for Technology Integration	July 2020
Deepening Reading Comprehension through STEM for Early Educators	July 2020

OSSE's Environmental Literacy Program

- Curricular resources supporting the Environmental Literacy Program can be found on the OSSE website.
  - Many of these resources were developed and/or informed by District teachers in the science master teacher cadre or the environmental literacy leadership cadre.
- The Environmental Literacy Leadership Cadre is a community of practice that meets to determine how to integrate environmental education at every grade level within the cadre member's school.
  - The cadre is supported by nonprofits that receive funding through the Environmental Literacy Advancement grant.
  - All environmental activities conducted through this grant are NGSS-aligned.

Partner with OSSE to Develop DC Science

OSSE is committed to engaging DC science educators in each phase of the assessment development process. Teachers and administrators with science expertise are invited to participate and provide feedback at several events throughout the year. Educators may sign up to be considered by completing an **online form**.

Selected upcoming opportunities include:

- Performance Level Descriptor Educator Review: February 2020
- Rangefinding – Setting Scoring Parameters: July 2020
- Item Content Review: Fall 2020
- Bias and Sensitivity Item Review: Fall 2020

Appendix

Background on The Next Generation Science Standards (NGSS)

The Next Generation Science Standards (NGSS)

- The Next Generation Science Standards (NGSS) are a set of rigorous K–12 science standards that were developed by states, for states. The NGSS identify scientific and engineering practices, crosscutting concepts, and core ideas in science that all K–12 students should master in order to prepare for success in college and 21st-century careers.
- The District adopted the NGSS in 2013 for implementation at all K-12 schools. Implementation of new standards required shifts and advancements in science instruction and the development of new assessments, including general assessments and alternate assessments for students with the most significant cognitive disabilities.

How is NGSS Different?

Science Content is Best Learned by Engaging in Practices

- Tight integration of 8 science and engineering practices as they relate to learning and applying disciplinary core ideas while making connections to cross-cutting concepts. This is in strong contrast to teaching “the scientific method” at the beginning of the year and then diving into a series of “content” lessons and lock-step labs.

All Children Can Learn Ambitious Science

- Research shows that all students can engage in ambitious science learning and problem-solving. Virtually all children come to school ready to learn science. They should be supported in building upon their experiences of the world as they develop conceptual understanding. This is true for children of all cultural backgrounds.

Engineering, Technology, and Applications of Science are Central to Science Education

- Includes learning goals related to engineering, technology, and applications of science across the K-12 span. It includes a focus on engaging students in the engineering practices involved in iterative design.

Preparing Students for College and 21st Century Careers

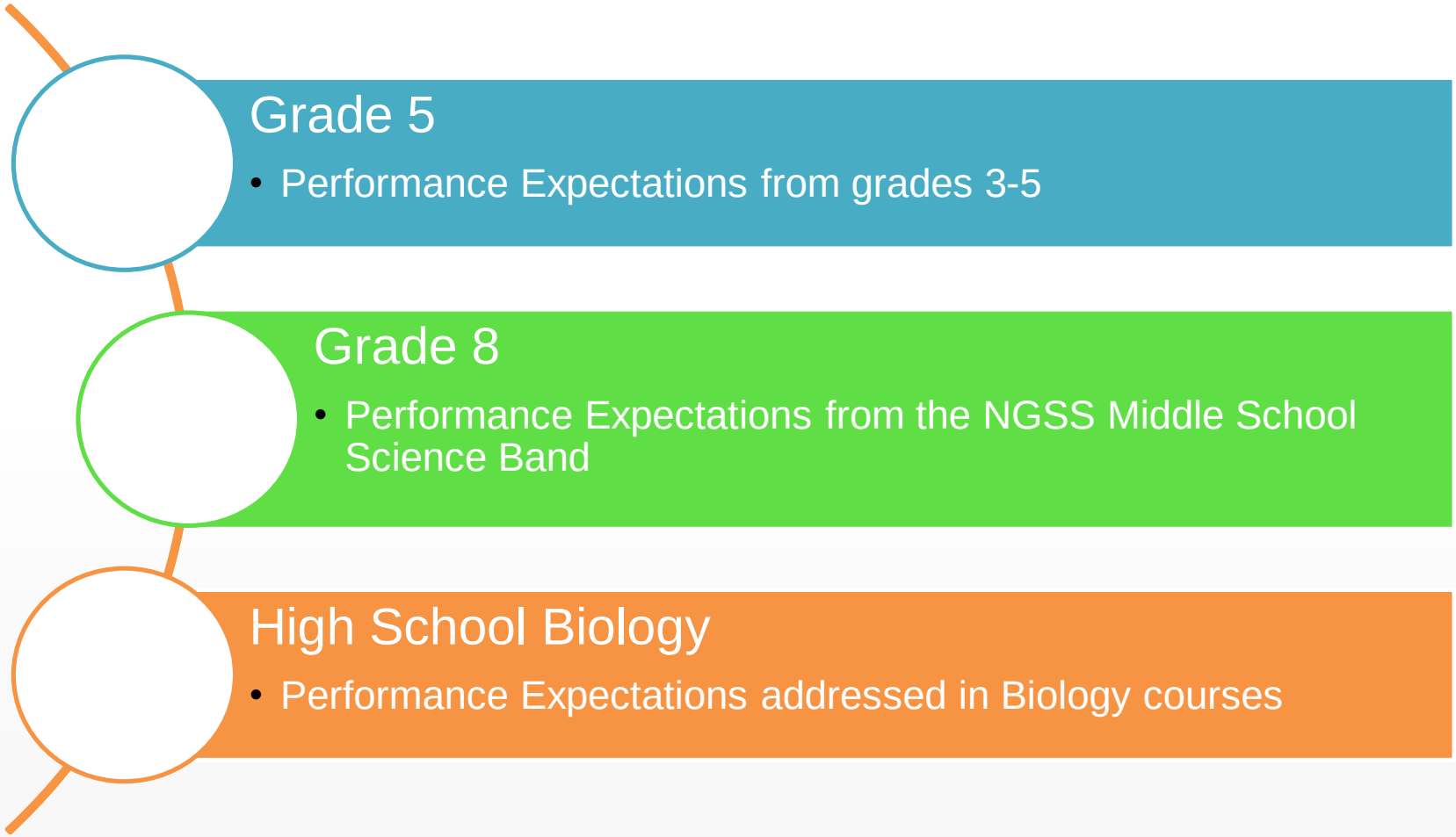
- Science education is central to the lives of all Americans, preparing them to be informed citizens in a democracy and knowledgeable consumers. Science literate individuals are more able to pursue expanding employment opportunities in science-related fields and compete in the global economy.
- The scientific practices in the NGSS include the critical thinking and communication skills that students need for postsecondary success and citizenship in a world fueled by innovations in science and technology.
- These science practices encompass the habits and skills that scientists and engineers use day in and day out. In the NGSS, these practices are wedded to content. In other words, content and practice are intertwined in the standards, just as they are in today's workplace.

Connections to Common Core State Standards (CCSS)

- Evidence-based reasoning is the foundation of good scientific practice. The NGSS incorporate reasoning skills used in language arts and mathematics to help students improve mastery and understanding in all three disciplines.
- The NGSS align grade by grade with the CCSS for Mathematics and English Language Arts, so concepts support what students are learning in their entire curriculum. Connections to specific CCSS are listed for each NGSS performance expectation, giving teachers a blueprint for building comprehensive cross-disciplinary lessons.
- The intersections between the NGSS and CCSS teach students to analyze data, model concepts, and strategically use tools through productive talk and shared activity. These practice-based standards help teachers foster a classroom culture where students think and reason together, connecting around the subject matter and core ideas.

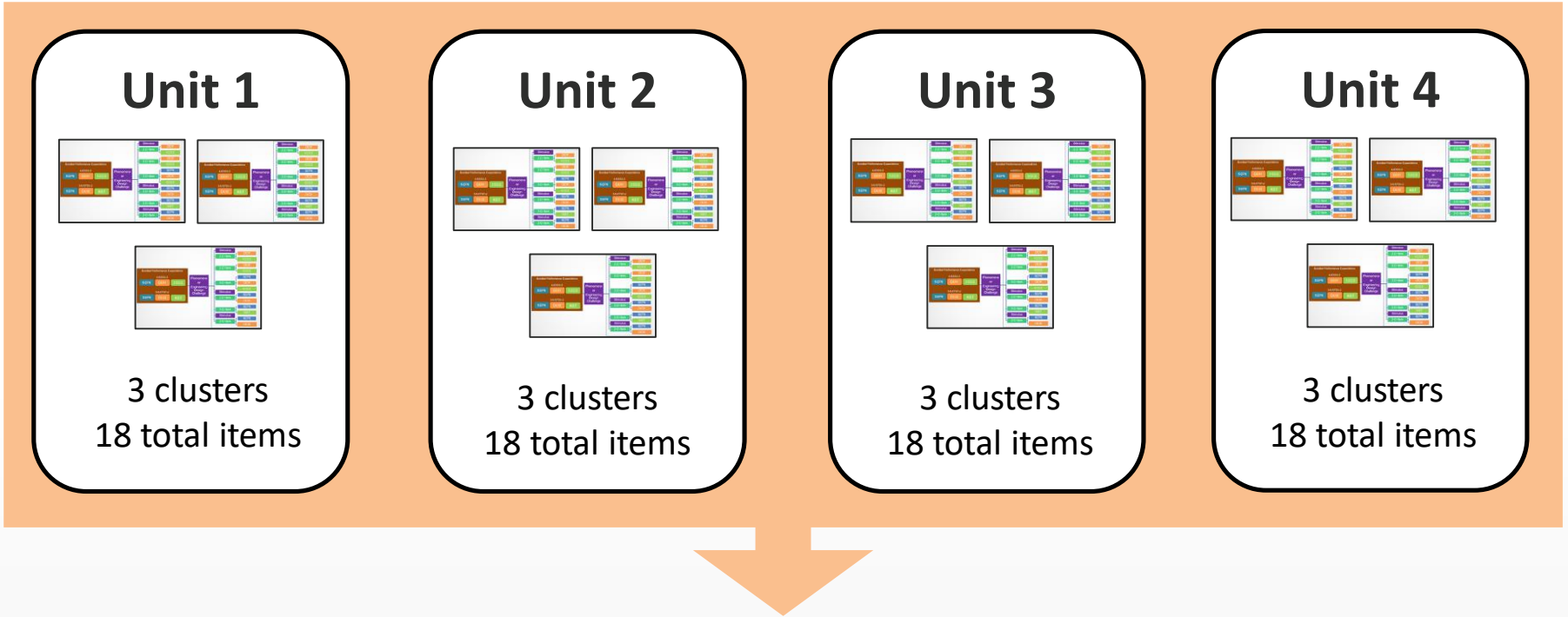
Background on The DC Science Assessment

DC Science Administration Grades/Courses



DC Science Assessment Design Map

DC Science is administered over four units. Field testing is embedded.

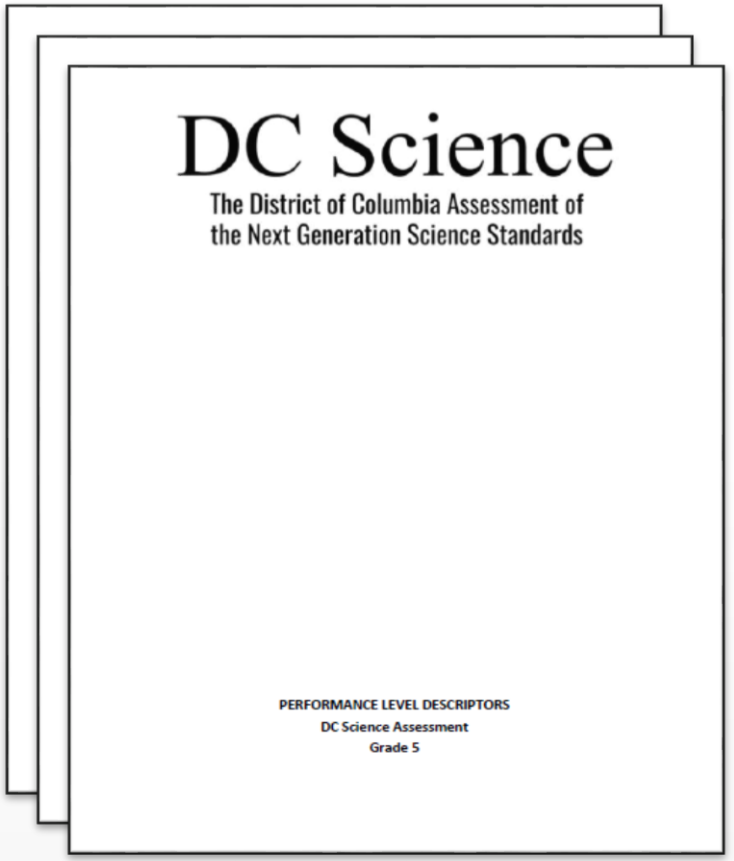


81 points contributing to an individual student report

3 embedded field test clusters, placed randomly in any unit

Performance Level Descriptors (PLDs)

- Outline the specific expectations of student performance
- Delineate what a typical student within a performance level would know and be able to demonstrate from a content perspective
- Show a progression of multidimensional performance across performance levels
- Have been developed for each assessed NGSS Performance Expectation



https://osse.dc.gov/science

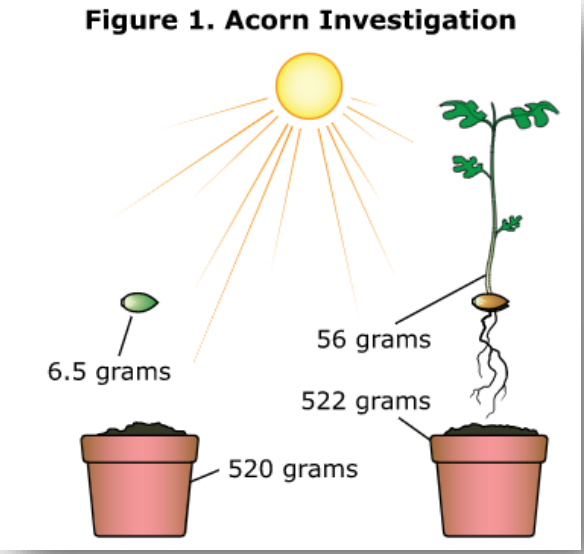
DC Science Performance Level Definitions

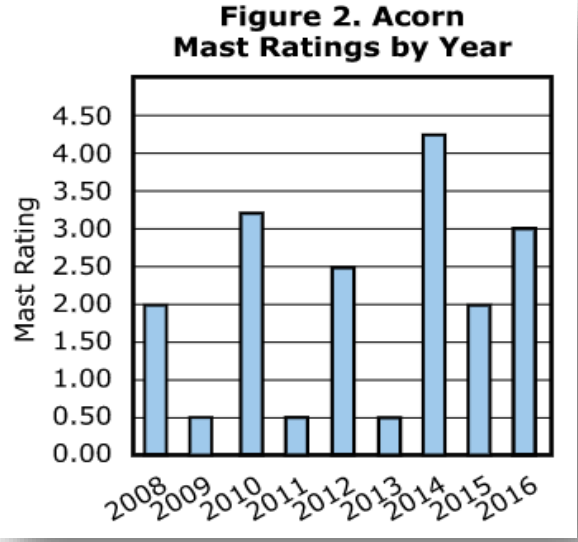
Exceeds Expectations	A student that *Exceeds Expectations* demonstrates **thorough understanding and sophisticated reasoning** when applying Disciplinary Core Ideas, using Science and Engineering Practices, and using Crosscutting Concepts to make sense of phenomena or address solutions in the natural or designed world.
Meets Expectations	A student that *Meets Expectations* demonstrates a **substantial understanding and relevant reasoning** when applying Disciplinary Core Ideas, using Science and Engineering Practices, and using Crosscutting Concepts to make sense of phenomena or address solutions in the natural or designed world.
Approaches Expectations	A student that *Approaches Expectations* demonstrates a **basic understanding and draws connections between and among science dimensions** when applying Disciplinary Core Ideas, using Science and Engineering Practices, and using Crosscutting Concepts to make sense of phenomena or address solutions in the natural or designed world.
Partially Meets Expectations	A student that *Partially Meets Expectations* demonstrates a **below-basic understanding and is not yet making connections between and among science dimensions** when using Disciplinary Core Ideas, using Science and Engineering Practices, and using Crosscutting Concepts to make sense of phenomena or address solutions in the natural or designed world.

Example of a PLD: Grade 5 Life Science (5-LS1-1)

Level 2: Approaching Expectations

Students can use a small, simple data set to construct an argument that plants need water and air to grow and that they take in water from soil through their roots.





Example of a PLD: Grade 5 PLD Life Science (5-LS1-1)

Level 3: Meets Expectations

Students can interpret two or more pieces of evidence, data, and/or models to construct an argument that plants acquire material for growth chiefly from air and water, that plants process matter using sunlight, and that plants absorb gases in air through their leaves.

Level 4: Exceeds Expectations

Students can interpret two or more pieces of data to construct or refine an argument that plants cycle water, taking it in through their roots and giving it off through their leaves, and that plants use carbon dioxide in the air and water to produce the sugar they need for growth.

DC Science Assessment Reporting

- Students and families receive the following individual student results for DC Science:
  - Overall scale score between 300 – 600
  - Performance level between 1 – 4

- In addition, students in grades 5 and 8 receive information on how they performed relative to the following science domains:
  - Physical Sciences
  - Life Sciences
  - Engineering and Space Science

DC Science Assessment Cut Scores

The DC Science Assessment has a scale of 300-600 with an anchor of 450 as meeting expectations.

Grade/Subject	Performance Level	Cut Score
Grade 5	Exceeds Expectations	476
	Meets Expectations	450
	Approaches Expectations	418
Grade 8	Exceeds Expectations	484
	Meets Expectations	450
	Approaches Expectations	409
Biology	Exceeds Expectations	476
	Meets Expectations	450
	Approaches Expectations	412

History of OSSE Professional Development for Science/NGSS

Early OSSE NGSS/Science Professional Development and Supports

- Math Science Partnership (MSP) Grants
- State Science Leadership Team (SSLT)
- Equip Training (Achieve, 2013 & 2014)
- Science Master Teacher Leader Cadres (SMTC)
- STEM Leadership Academy for Principals (Inspired Teaching, 2014 & 2015)
- Additional training sessions included:
    - NGSS 101 Webinars
    - NGSS 201 for School Leaders Webinars
    - NGSS Presentations at LEA Institutes
    - DC STEM Fairs/TGR Educator STEM Elementary & Secondary PD, Spring 2016-18

Recent OSSE NGSS Professional Development

- NGSS Five Tools and Processes
- 2018 Integrated STEM Development Program (TGR Foundation)
- 2019 Skills and Strategies to Adapt Math and Science for English Learners
- 2019 Life Sciences Content Fellowship
- Additional training sessions included:
  - Supporting ELLs in Science Webinar Fall 2018
  - STEM School Toolkit Webinar, Fall 2018
  - Deepening Reading Comprehension through STEM (2018-2019)
  - ESSA & The Computer Science Framework: Technology Planning and Supporting Implementation Webinar, Fall 2018

Recent OSSE NGSS Professional Development (cont.)

- Supporting Learning with Technology Integration, Fall 2018
- Environmental Workshop for Early Learners, Spring 2018
- Storytelling through Scratch, Spring 2018
- National Science Teachers Association Conference Registration Support Spring 2018 & 2019
- STEAM: Exploring Cross-curricular Approaches (Crayola) Summer 2018
- Early Engineering with Structures (NASM) Summer 2018 & 2019
- Exploring Light with Young Children Summer 2018 & 2019
- Mathematics with Crayola for Elementary School Educators Fall 2018
- Artful Engineering: Exploring Simple Machines through Drama, Movement, and Music (Wolf Trap Foundation) Summer 2019