The background is a dark blue gradient with abstract white and light blue geometric patterns. On the left, there are large concentric circles with degree markings ranging from 150 to 260. On the right, there are smaller concentric circles with arrows indicating a clockwise direction. The overall design is clean and modern, with a focus on mathematical themes.

WHAT'S NEW IN TEXAS MATHEMATICS

DR. PAUL GRAY

CHIEF CURRICULUM OFFICER, COSENZA & ASSOCIATES, LLC



@texmathguy

#Tleduleaders

OVERVIEW

- High school course options and HB5 graduation pathways
- HS Assessment:
 - Algebra 1 EOC and Revised TEKS
 - Role of Algebra 2 and Algebra 2 EOC
- Analysis of 2015 STAAR Math scores
- New Phase-in Standards

HB5 GRADUATION PLANS

- Foundation Plan – Math Requirements
- Endorsements – Math Possibilities



HB5 – FOUNDATION REQUIREMENTS

- HB5 requires all students to take Algebra 1, Geometry, and “Advanced Mathematics”
- 3 math credits total
- “Advanced Math” includes selection from one of two lists

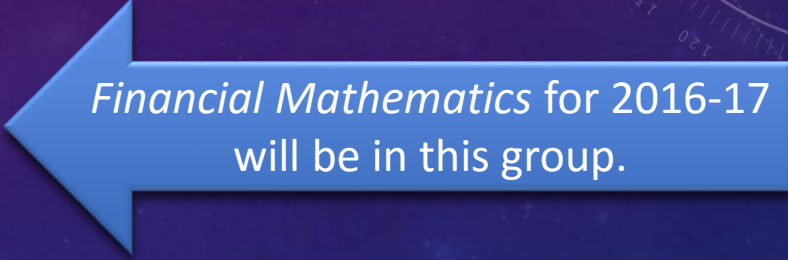


HB5 – FOUNDATION REQUIREMENTS ADVANCED MATHEMATICS

- Mathematical Models with Applications;
- Mathematical Applications in Agriculture, Food, and Natural Resources (CTE);
- Digital Electronics (CTE); and
- Robotics Programming and Design (Tech).
- Algebra II;
- Precalculus;
- Advanced Quantitative Reasoning;
- Independent Study in Mathematics;
- Discrete Mathematics for Problem Solving;
- Algebraic Reasoning;
- Statistics;
- AP Statistics;
- AP Calculus AB, AP Calculus BC
- AP Computer Science;
- IB Mathematics courses
- Engineering Mathematics; (CTE)
- Statistics and Risk Management; (CTE)
New title: Statistics and Business Decision Making (2017)
- Discrete Mathematics for Computer Science; (Tech)

CTE OR TECH COURSES ELIGIBLE FOR MATH CREDIT 2015-16 AND 2016-17 SCHOOL YEARS

- Mathematical Applications in Agriculture, Food, and Natural Resources (CTE);
- Digital Electronics (CTE); and
- Robotics Programming and Design (Tech).
- Engineering Mathematics; (CTE)
- Statistics and Risk Management; (CTE)
New title: Statistics and Business Decision Making (2017)
- Discrete Mathematics for Computer Science; (Tech)



Financial Mathematics for 2016-17
will be in this group.

Color-coding:

White = does not require Algebra 2 and only Foundation diploma

Orange = requires Algebra 2 and either Foundation or Endorsement credit

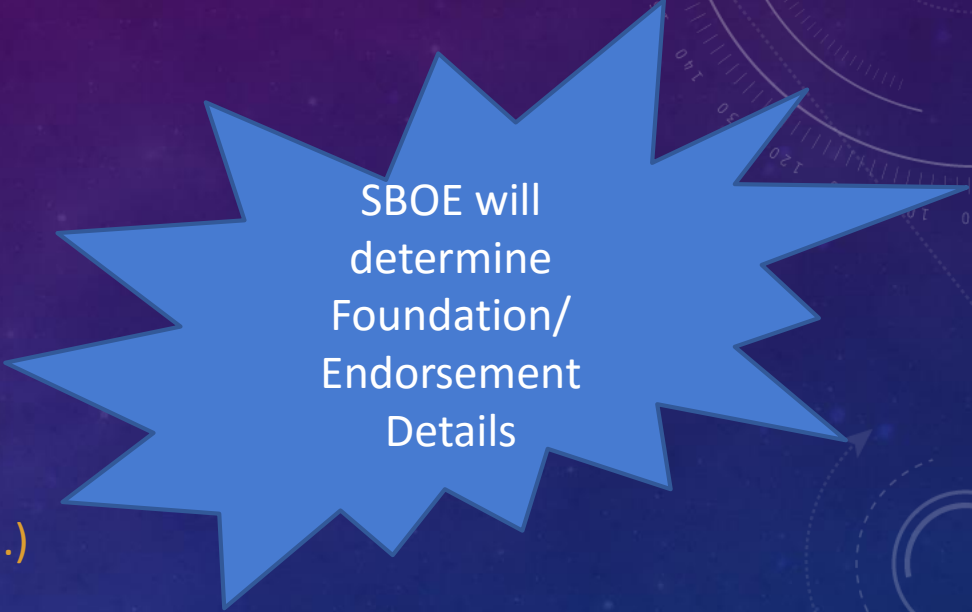
OVERVIEW OF CERTIFICATION REQUIREMENTS

Course	CTE/Tech Options	Math Options	Training?
Mathematical Applications in Agriculture, Food, and Natural Resources (CTE)	Vocational Agriculture certification	Math Physics/Math Math/Phys.Sci/Eng.	TEA-approved training
Digital Electronics (CTE)	Secondary Industrial or Tech Ed certification	Math Physics/Math Math/Phys.Sci/Eng.	TEA-approved training
Robotics Programming and Design (Tech)	Computer Science		
Engineering Mathematics (CTE)	Secondary Industrial or Tech Ed certification	Math Physics/Math Math/Phys.Sci/Eng.	TEA-approved training
Statistics and Risk Management; (CTE)	Business certification	Math Physics/Math Math/Phys.Sci/Eng.	TEA-approved training
Discrete Mathematics for Computer Science (Tech)	Computer Science		

Source: <http://ritter.tea.state.tx.us/sbecrules/tac/chapter231/ch231e.html>

NEW CTE COURSES ELIGIBLE FOR MATH CREDIT 2017-18 SCHOOL YEAR

- Accounting II (CTE)
- Applied Math for Technical Professionals (CTE – Car. Dev.)
- Financial Mathematics (CTE)
- Manufacturing Engineering Technology II (CTE – Alg2 Recomm.)
- Math for Medical Professionals (CTE)
- Robotics II (CTE)



SBOE will
determine
Foundation/
Endorsement
Details



Certification
Requirements TBD

*Mathematical
Applications in
AFNR*

Arts, A/V
Technology,
and Communi-
cations

Education
and Training

Marketing

Architecture
and
Construction

Business
Mgmt. and
Admin.

Hospitality
and Tourism

Accounting II
*Statistics and
Risk
Management*
Financial Math

Gov't and
Public
Admin.

Human
Services

Information
Technology

*Manufacturing
Engineering
Technology II*

Digital Electronics

Robotics II
*Engineering
Mathematics*

Law, Public
Safety,
Corrections,
and Security

*Math for Medical
Professionals*

Transporta-
tion,
Distribution,
and Logistics

*Robotics
Programming
and Design*
*Discrete Math for
Computer Sci.*

*Applied Math for
Tech. Prof.*

Many community college career programs demand little or no use of mathematics. To the extent that they do use mathematics, the mathematics needed by first year students in these courses is almost exclusively middle school mathematics.

National Center on Education and the Economy, *What Does It Really Mean to Be College and Work Ready?*

<http://www.ncee.org/college-and-work-ready/>

Five Good Reasons to Take Algebra 2

- A2 teaches students to solve problems with multiple variables.
- Necessary for STEM careers
- Important skill for trade and technical careers
- Helps develop critical thinking skills
- Keeps doors open to future opportunities

Leanne Ketterlin-Geller, Southern Methodist University
<http://www.smu.edu/News/2014/algebra-05june2014>

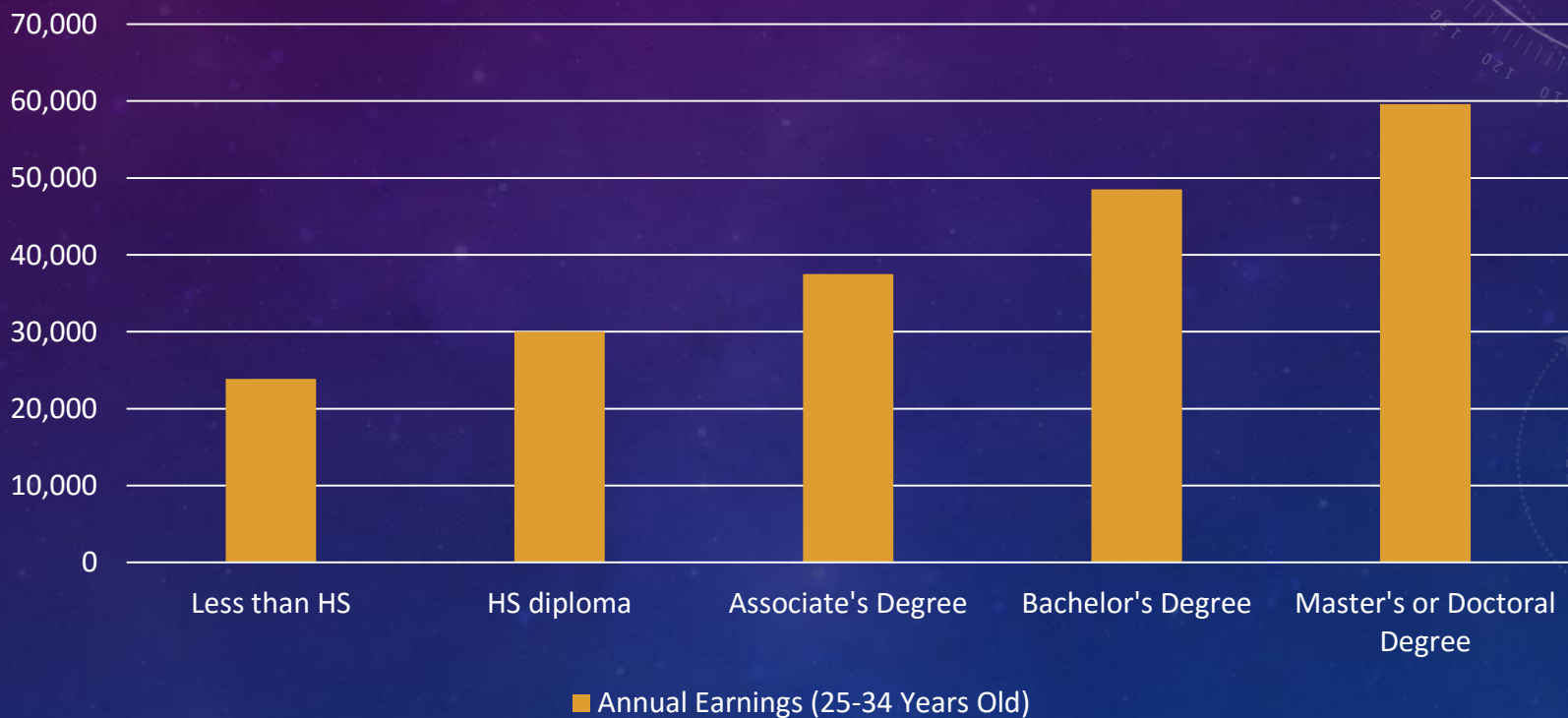
“If you don’t take Algebra 2, you will be shut out of a college degree in business,” said James Epperson, an associate professor at the University of Texas at Arlington’s department of mathematics. “You won’t ever become a scientist or an engineer.”

Fort Worth Star-Telegram, Feb. 17, 2014

<http://www.star-telegram.com/news/local/education/article3846265.html>

ALGEBRA 2? OR NOT ALGEBRA 2?

Annual Earnings (25-34 Years Old)



Source: National Center on Education Statistics,
http://nces.ed.gov/programs/coe/indicator_cba.asp

WHAT ABOUT ALGEBRA 2?

Essentials

- University preparation
- Any higher education program requiring College Algebra
- Calculus-intending students

Negotiables

- Any higher education program requiring Statistics pathways
- Direct career-entry (non-STEM fields)
- Students pursuing professional certification after high school

HB5 – ENDORSEMENT POSSIBILITIES

To earn an endorsement, a student must obtain a fourth mathematics credit (1.0 or 0.5 + 0.5)

- Algebra II;
 - Precalculus;
 - Advanced Quantitative Reasoning;
 - Independent Study in Mathematics;
 - Discrete Mathematics for Problem Solving;
 - Algebraic Reasoning;
 - Statistics;
 - AP Statistics, Calculus, Computer Science;
 - International Baccalaureate (IB) courses
 - Engineering Mathematics; (CTE)
 - Statistics and Risk Management; (CTE)
 - Discrete Mathematics for Computer Science; (Tech)
 - IHE credit eligible courses
 - Courses required for industry-recognized credentials
 - ~~Mathematical Models with Applications, if credit is earned prior to September 1, 2015, or September 1 of a subsequent year in Algebraic Reasoning and Statistics is implemented~~
 - College Preparatory Mathematics course
- Beginning in 2017-18:*
- Accounting II (CTE)
 - Applied Math for Technical Professionals (CTE – Car. Dev.)
 - Financial Mathematics (CTE)
 - Manufacturing Engineering Technology II (CTE – Alg2 Recommended)
 - Math for Medical Professionals (CTE)
 - Robotics II (CTE)

HB5 – ENDORSEMENT POSSIBILITIES

STEM Endorsement

- Algebra II required
- Two post-Algebra II math credits

Business and Industry Endorsement

- 4th math credit
- No specific math requirements

Public Services Endorsement

- 4th math credit
- No specific math requirements

Arts and Humanities Endorsement

- 4th math credit
- No specific math requirements

Multidisciplinary Studies Endorsement

- 4th math credit
- No specific math requirements

GRADUATION PATHWAYS – CHOICES AND IMPLICATIONS

- HB5 intent was to broaden district's abilities to customize graduation pathways to local workforce needs
- All districts must offer at least one endorsement (and if it's only one, it's Multidisciplinary Studies).
- Districts may choose to offer additional endorsements based on local needs.



HB5 was passed in May 2013 when:
Oil was \$100+/bbl and there were
2,395 oil wells operating in Texas.

May 2016:
Oil is \$43/bbl and there are 947 oil
wells operating in Texas.

POSSIBLE PATHWAY

STEM ENDORSEMENT: ENGINEERING FOCUS

Middle School	9 th Grade	10 th Grade	11 th Grade	12 th Grade
	Algebra 1 (F)	Geometry (F)	Algebra 2 (F)	Precalculus (E)
	ROTC/PE	Concepts of Engineering and Technology (E)	Principles of Technology (E)	Engineering Design and Problem Solving (E)
	English 1 (F)	English 2 (F)	English 3 (F)	English 4 (F)
	Foreign Language 1 (F)	Foreign Language 2 (F)	Fine Art (F)	Engineering Mathematics (E)
	Biology (F)	Chemistry (F)	Physics (F)	AP Physics, AP Biology, or AP Chemistry (E)
	World History (F)	World Geography (E)	US History (F)	Government/Economics (F)
	Elective (F)	Elective (F)	Elective (F)	Elective (F)

This pathway: Algebra 2 + 2 math credits (Precalculus and Engineering Mathematics)
Also, coherent CTE sequence 4+ courses

POSSIBLE PATHWAY

PUBLIC SERVICES ENDORSEMENT: MEDICAL FOCUS

Middle School	9 th Grade	10 th Grade	11 th Grade	12 th Grade
	Algebra 1 (F)	Geometry (F)	Algebra 2 (F)	Mathematics for Medical Professionals* (E)
	ROTC/PE	Principles of Health Science (E)	Health Science Theory (E)	Practicum in Health Science I (E)
	English 1 (F)	English 2 (F)	English 3 (F)	English 4 (F)
	Foreign Language 1 (F)	Foreign Language 2 (F)	Fine Art (F)	Practicum in Health Science I (E) (2 nd credit)
	Biology (F)	Chemistry (F)	Anatomy & Physiology (F)	Medical Microbiology (E)
	World History (F)	World Geography (E)	US History (F)	Government/Economics (F)
	Elective (F)	Elective (F)	Elective (F)	Elective (F)

Electives required for Public Services Endorsement (4+ coherent CTE, including #3+ in a sequence)

POSSIBLE PATHWAY MULTIDISCIPLINARY STUDIES

Middle School	9 th Grade	10 th Grade	11 th Grade	12 th Grade
	Algebra 1 (F)	Geometry (F)	Algebraic Reasoning (F)	Statistics* (E)
	ROTC/PE	Elective (E)	Elective (E)	Elective (E)
	English 1 (F)	English 2 (F)	English 3 (F)	English 4 (F/E)
	Foreign Language 1 (F)	Foreign Language 2 (F)	Fine Art (F)	Elective
	Biology (F)	Chemistry (F)	Physics(F)	Earth Space Science (E)
	World History (F)	World Geography (E)	US History (F)	Government/ Economics (F)
	Elective (F)	Elective (F)	Elective (F)	Elective (F)

- four credits in each of the four foundation subject areas to include English IV and chemistry and/or physics
- 2 additional elective credits

GRADUATION PATHWAYS

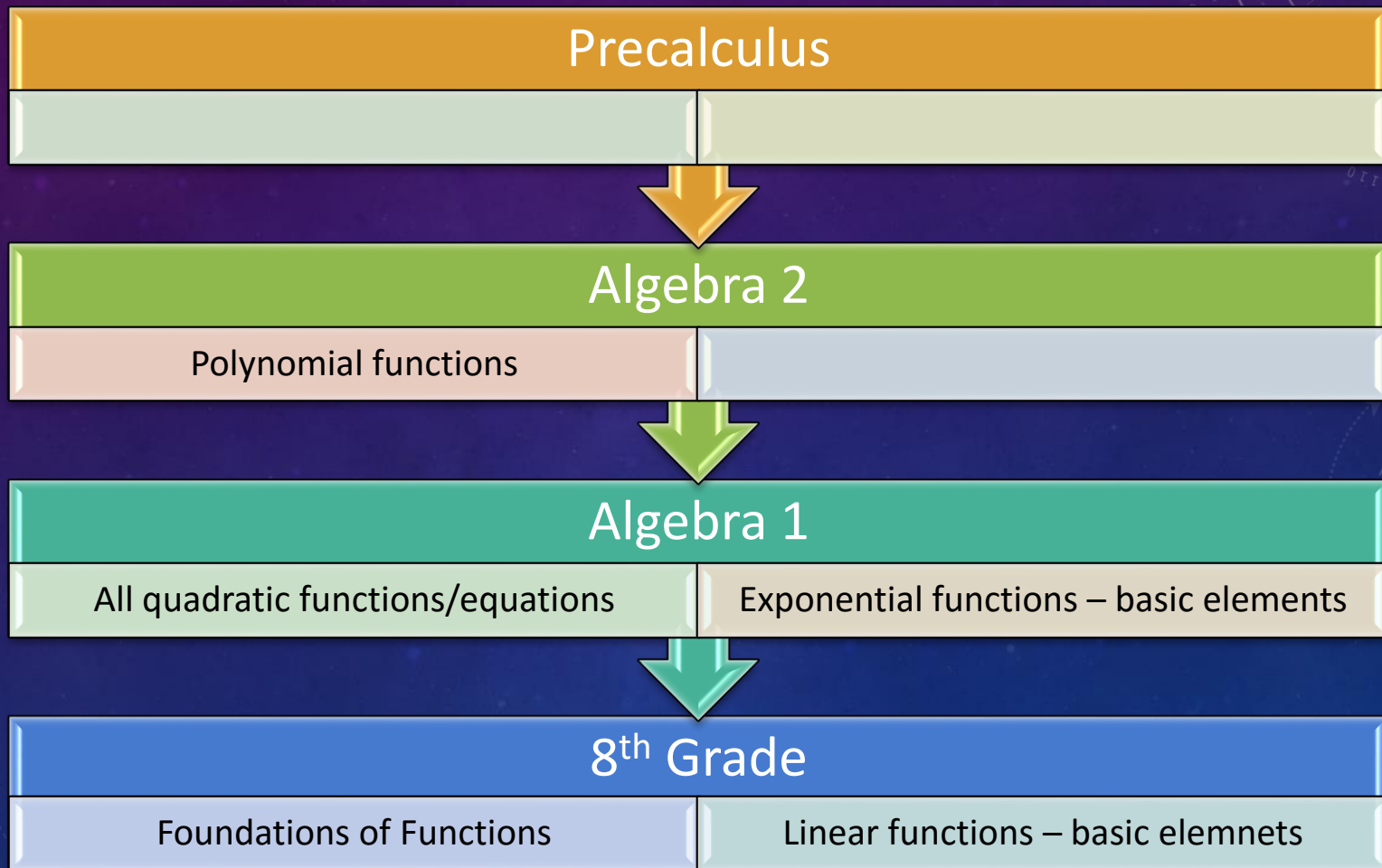
- What programs meet my community needs?
- What program do I have the resources (teachers, instructional materials, equipment, facilities) to sustain?
- How well can my counselors and teachers advise students and parents about the endorsements offered in my district?

HIGH SCHOOL ASSESSMENT DILEMMAS

- Algebra 1 EOC – Revised TEKS?
- Algebra 2 EOC – Yea or Nay?



REVISED HS MATH TEKS



WHAT IS “OVERLAP CURRICULUM?”

2008 Algebra 1 TEKS

2012 Algebra 1 TEKS

Old A.1A
Independent and
Dependent Variables

Old A.5B = New A.2A
Domain and Range of
Linear Functions

Old A.8B = New A.5C
Solve Systems of
Equations

Old A.10A = New A.8A
Solve Quadratic
Equations

New A.2H
Write Linear
Inequalities (2 vars)

Note: These are examples,
not an exhaustive list.

NEW MATH TEKS: ALGEBRA 1 EOC IMPLICATIONS

December 2015 STAAR Algebra 1 was based on overlap curriculum and original blueprint.

May 2016 and July 2016 STAAR Algebra 1 based on overlap curriculum and new blueprint.

Algebra 1 Retesters in the 2015-16 school year (taught old Algebra 1 curriculum)

- Tested only over overlap curriculum
- December 2015 retest – current blueprint and performance standards
- May 2016 and July 2016 – new blueprint and performance standards
- December 2016 and later - all Algebra 1 EOCs will be based on new TEKS with new blueprint and performance standards.

ALGEBRA 2 EOC CONSIDERATIONS

Pros

- Data to reveal strength of Algebra 2 program
- Measures postsecondary readiness (helps with schools/districts meeting this indicator – along with Algebra 1 EOC, SAT, ACT, PSAT, etc.)
- Cannot be used by TEA for accountability
- Cannot be used by ISD's for teacher evaluations
- Cannot be used for student's grades or class rank

Cons

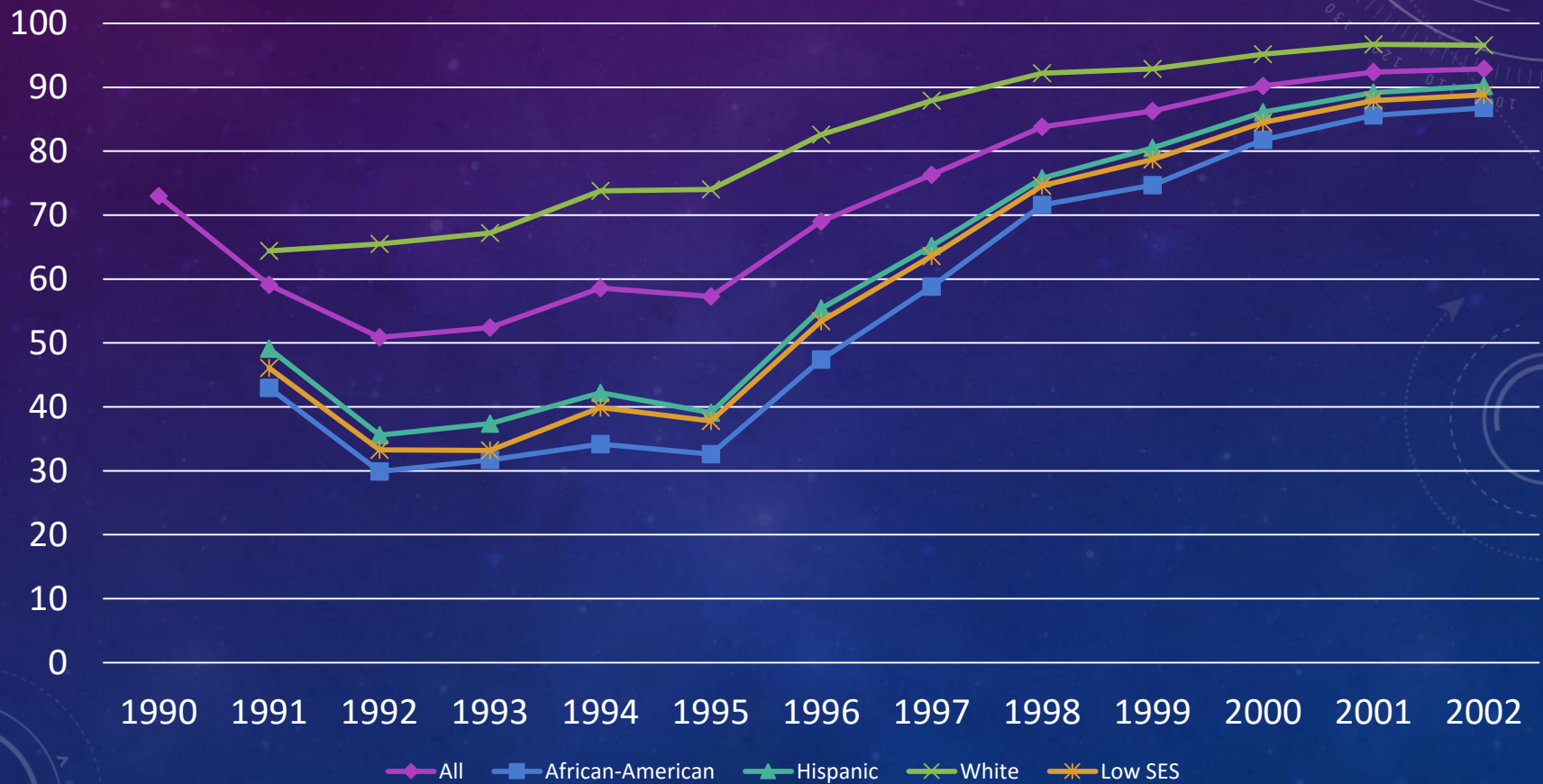
- Administering another EOC
 - Logistics for planning/administering
 - Local political considerations
- All or nothing – all of a district's Algebra 2 students take it or none of them do

ANALYSIS OF 2015 STAAR MATH DATA



SETTING SOME CONTEXT

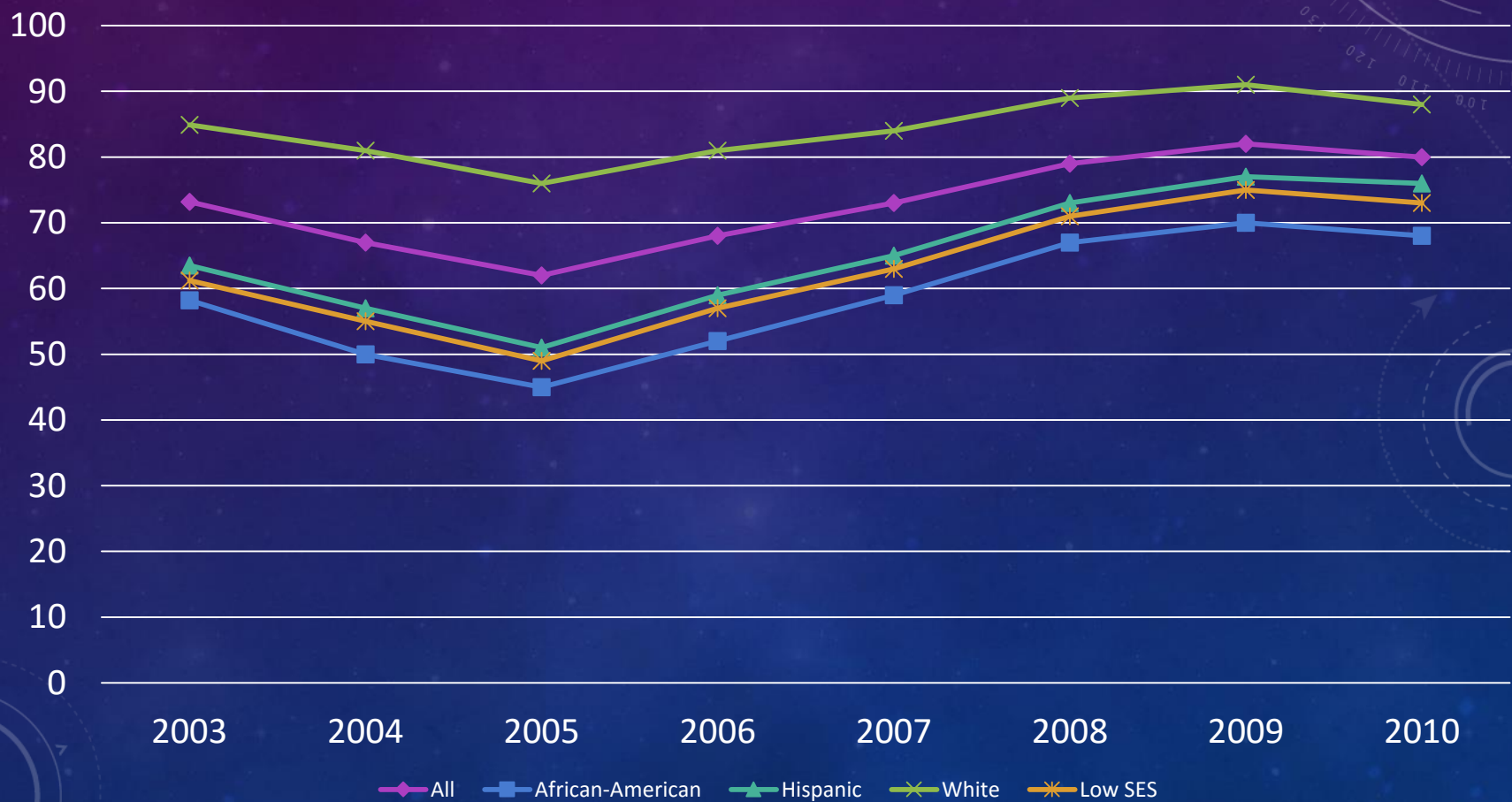
Student Performance, TAAS Math (Grade 8)



SETTING SOME CONTEXT

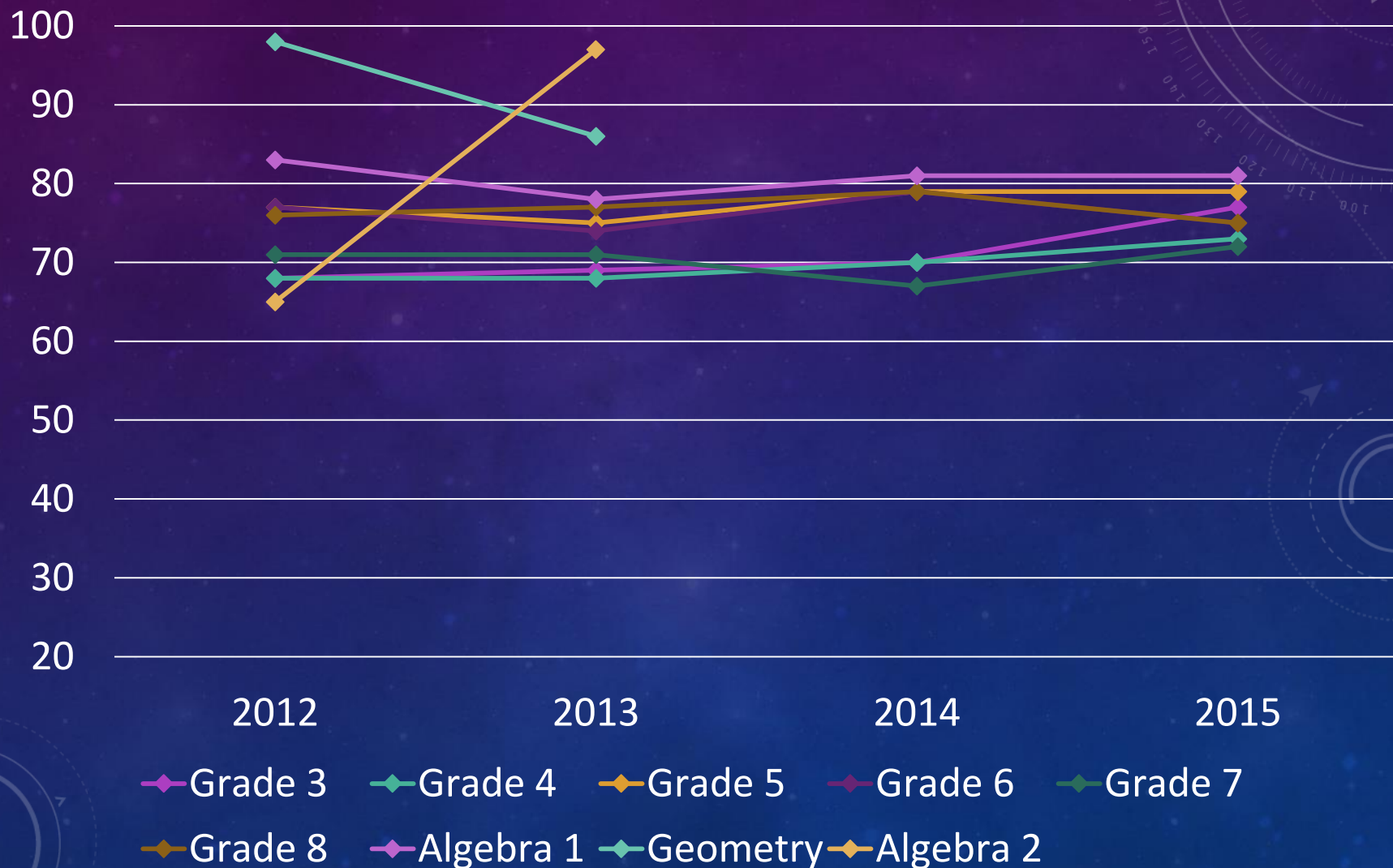
1st Admin
only

Student Performance, TAKS Math (Grade 8)



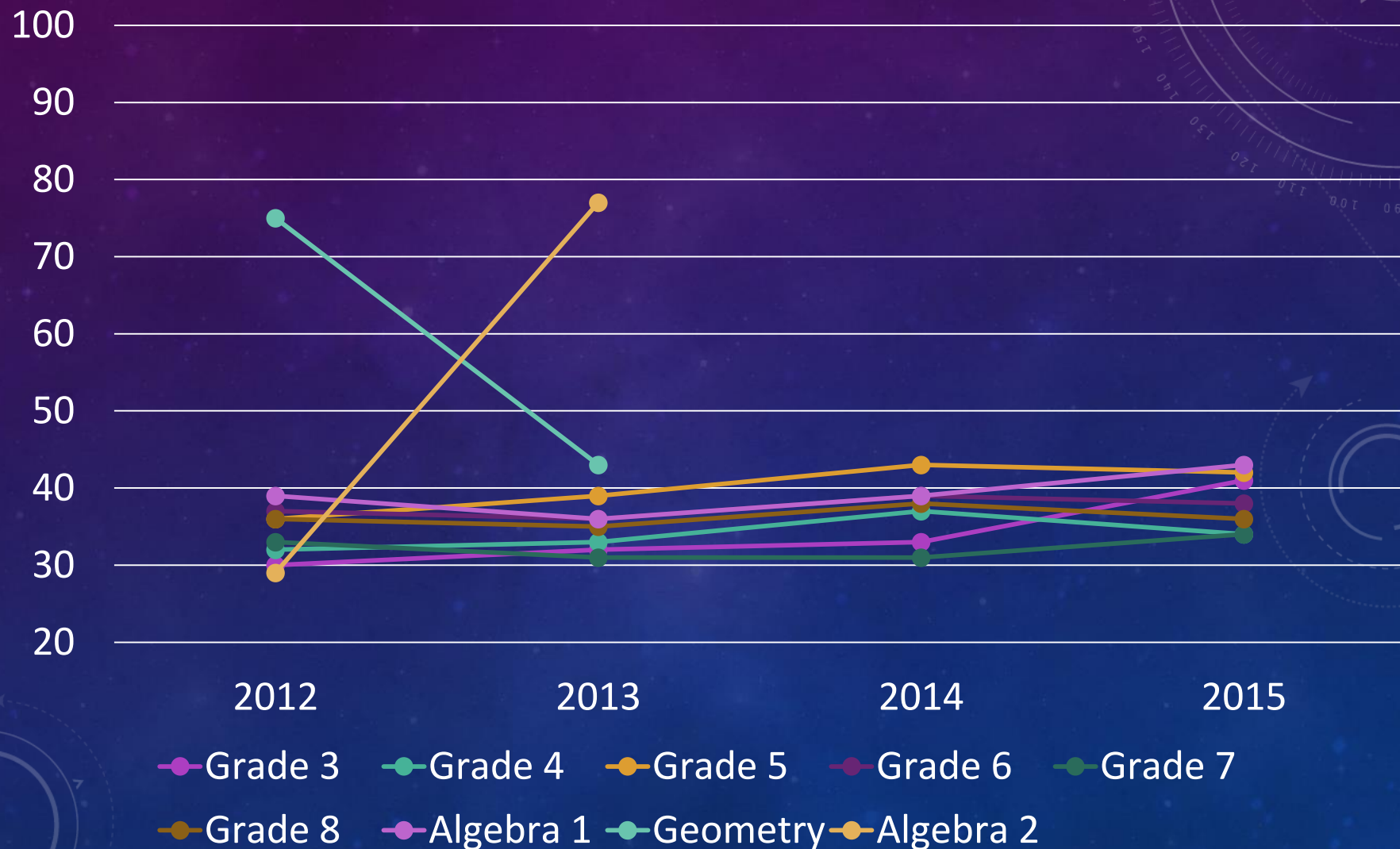
HERE WE ARE!

STAAR Math Student Performance, Phase-in Standard



HERE WE ARE!

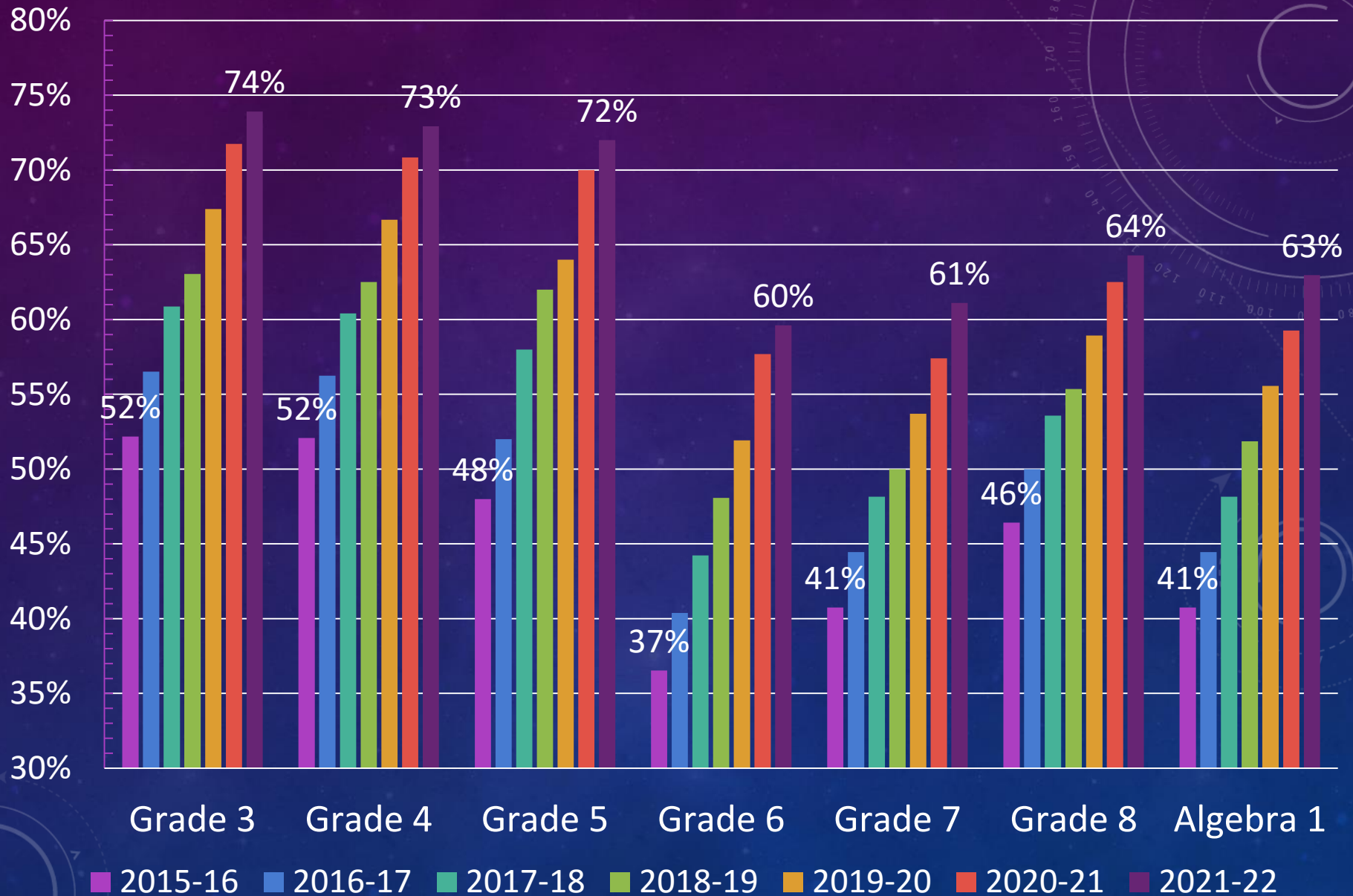
STAAR Math Student Performance, Recommended Std.



PHASE-IN RECOMMENDATIONS



Percent Correct, STAAR Math Phase-in



“

It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be. ”

--Isaac Asimov

Dr. Paul Gray

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