

State of Assessment: How Does Texas Measure Up?

PAUL GRAY

CAMT 2017

SESSION 2222, JULY 11, 2017



@texmathguy
#TXAlgReas

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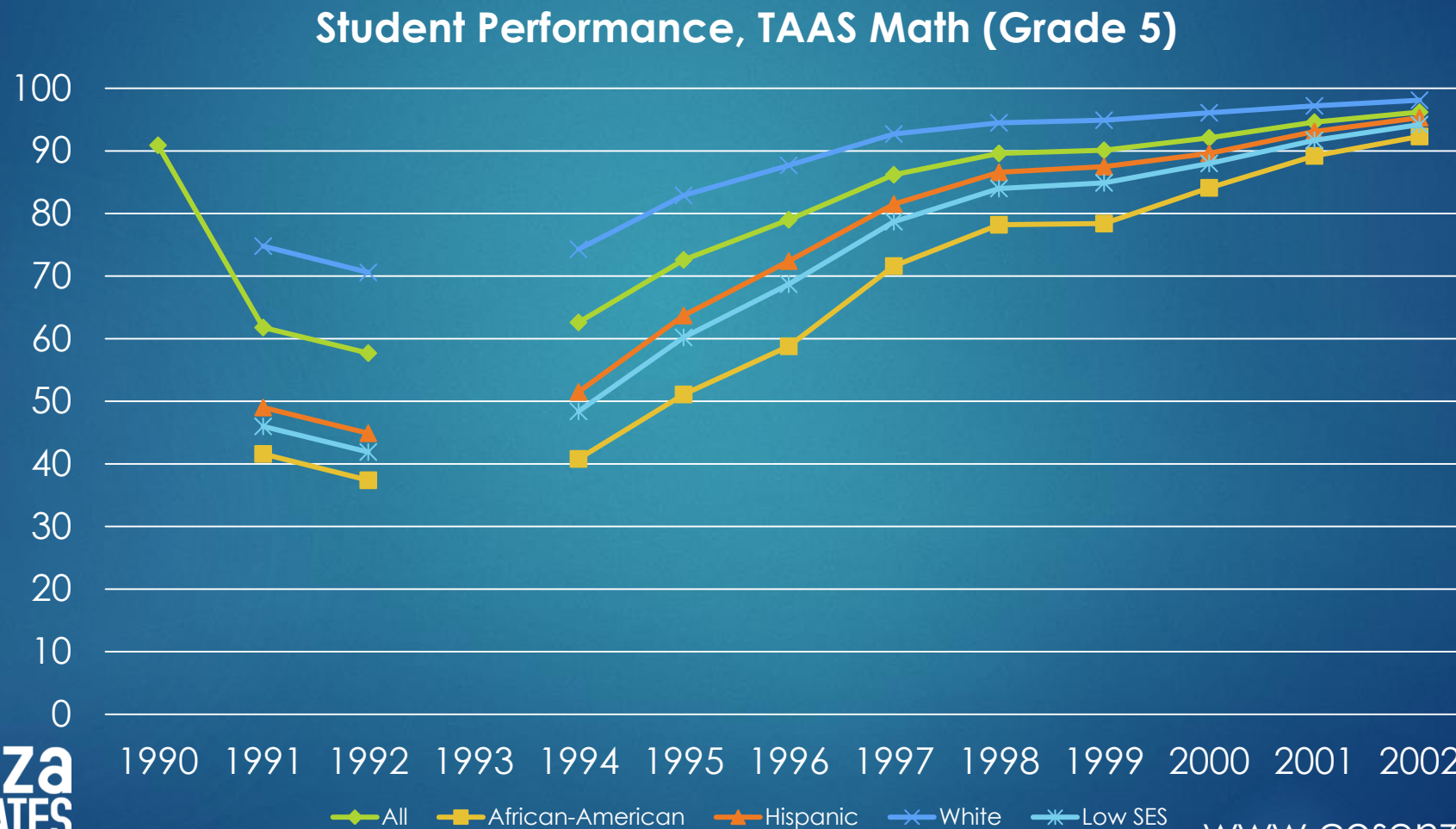
Overview

- ▶ Texas Journey of Math Assessment
- ▶ National Story of Math Assessment
- ▶ International Story of Math Assessment
- ▶ Sightseeing: STAAR, other states' tests, NAEP, TIMSS Items
- ▶ Analysis and Implications



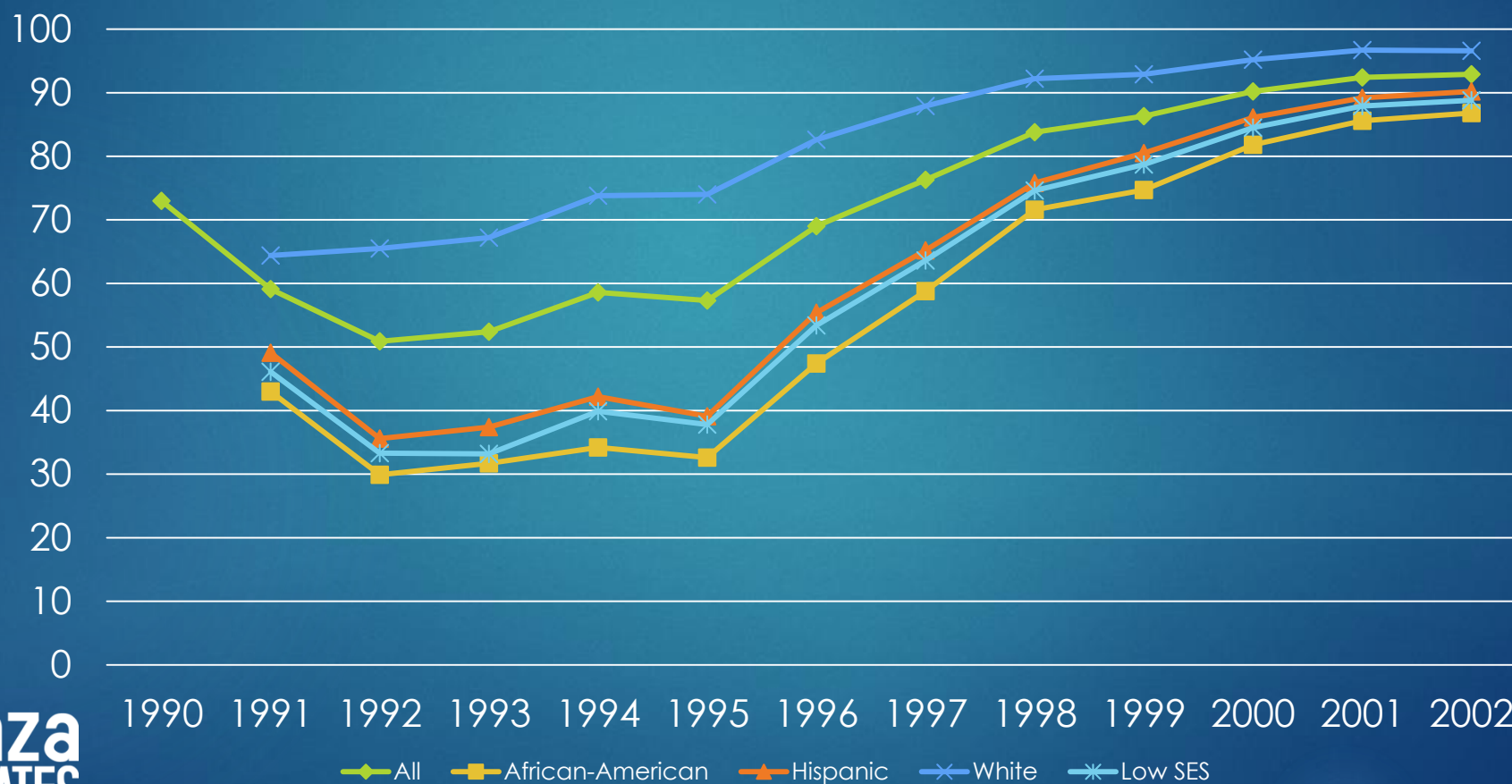
Texas Journey of Math Assessment

Texas Assessment of Academic Skills (TAAS)



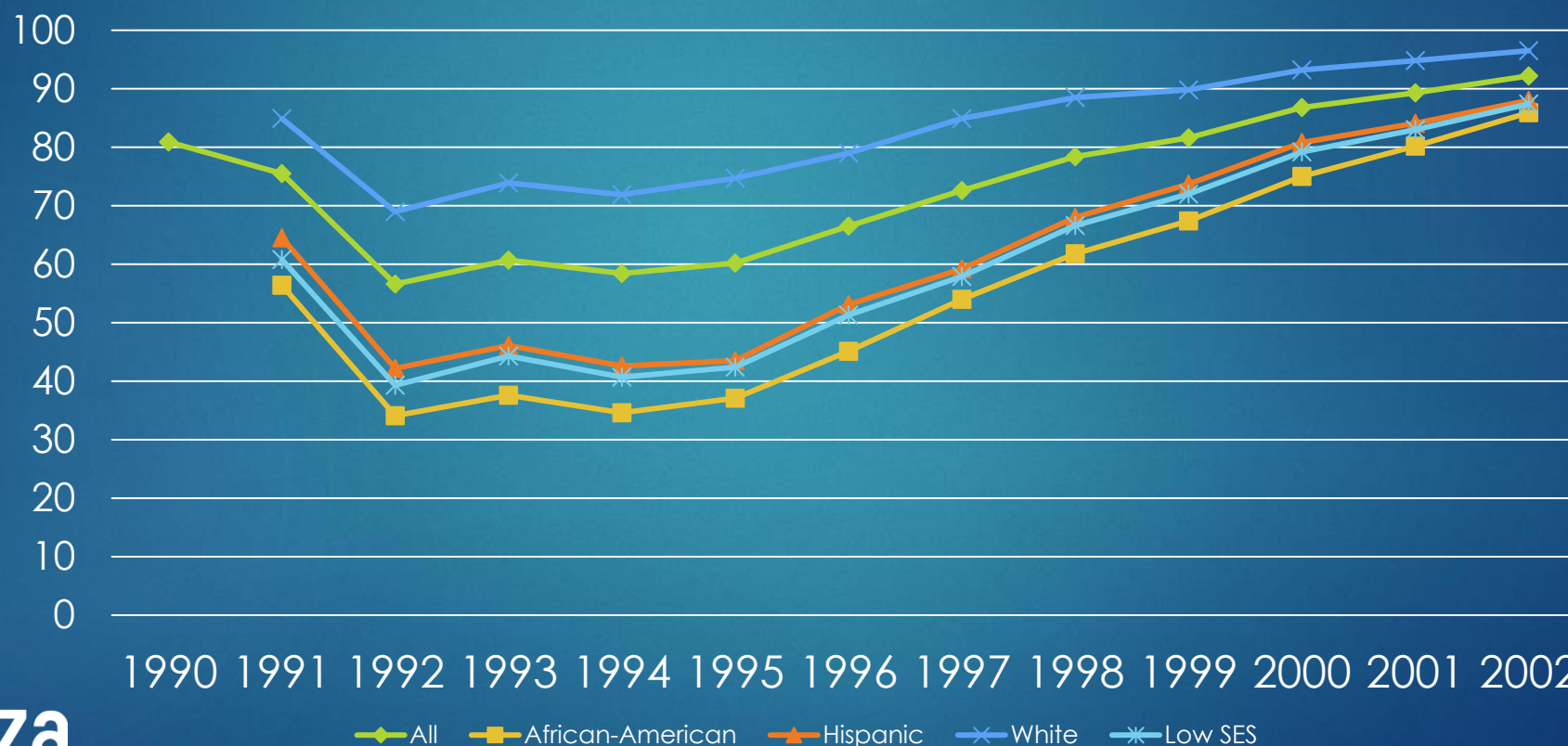
Texas Assessment of Academic Skills (TAAS)

Student Performance, TAAS Math (Grade 8)



Texas Assessment of Academic Skills (TAAS)

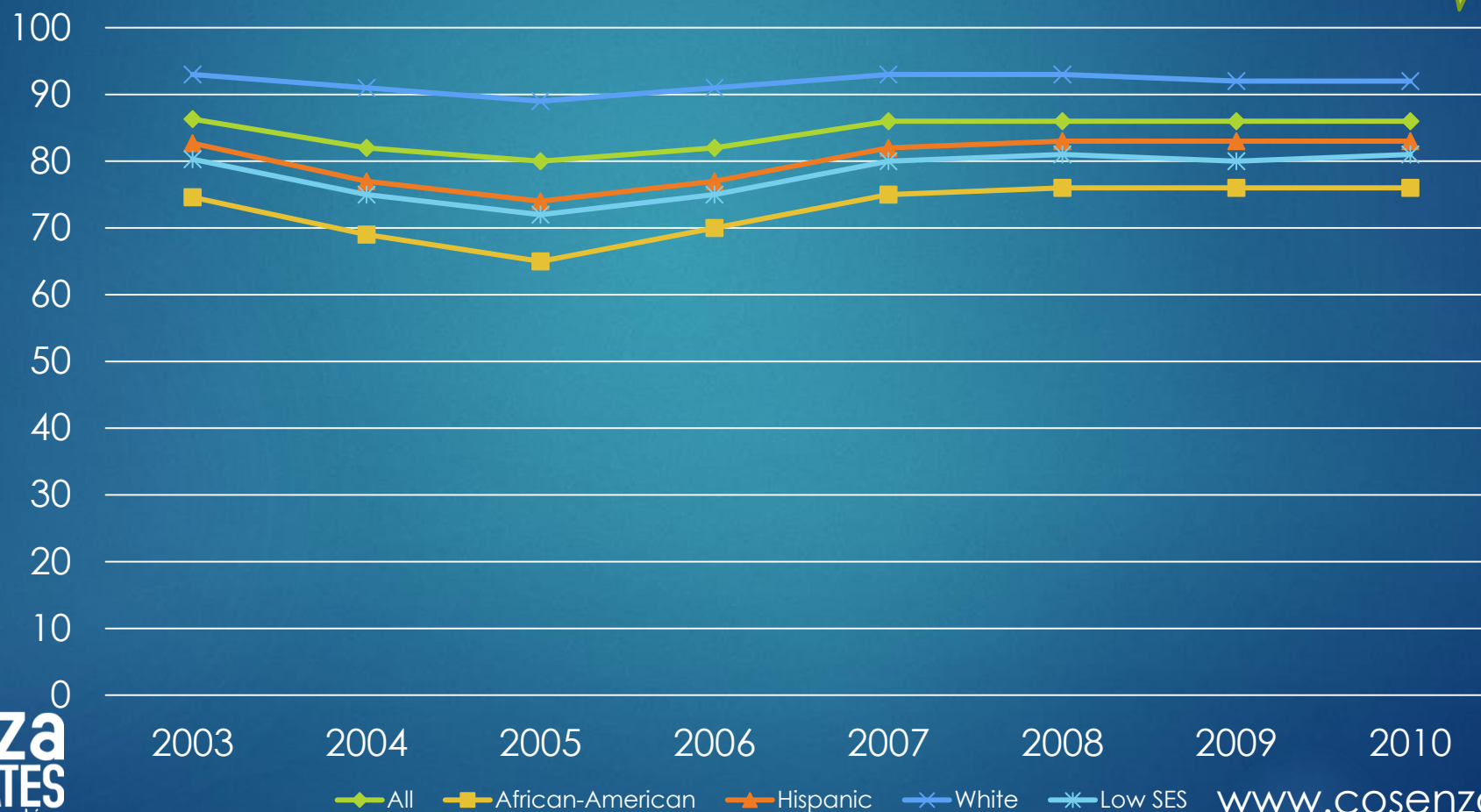
Student Performance, TAAS Math (Exit Level)



Texas Assessment of Knowledge and Skills (TAKS)

1st
Admin
only

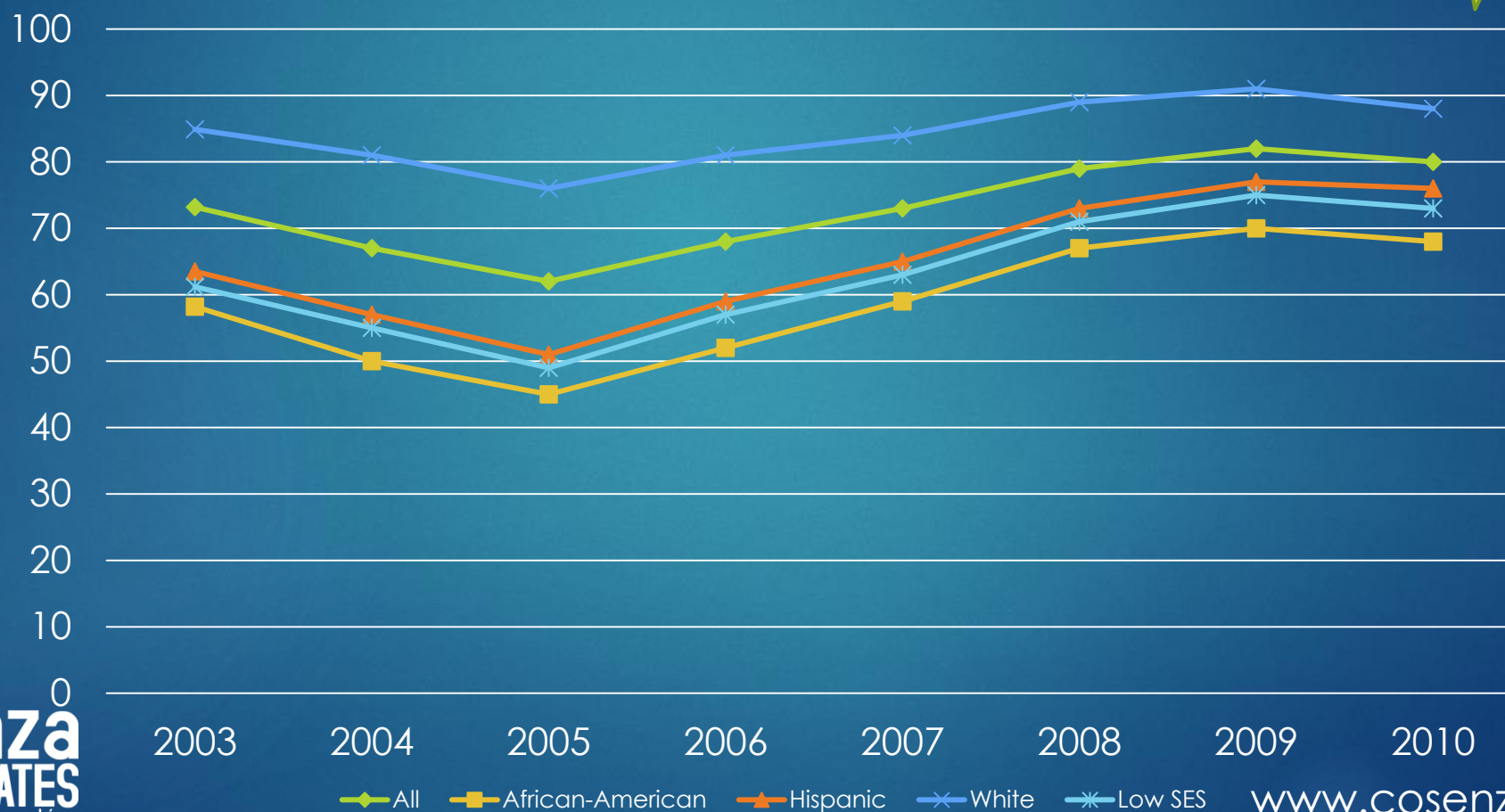
Student Performance, TAKS Math (Grade 5)



Texas Assessment of Knowledge and Skills (TAKS)

1st
Admin
only

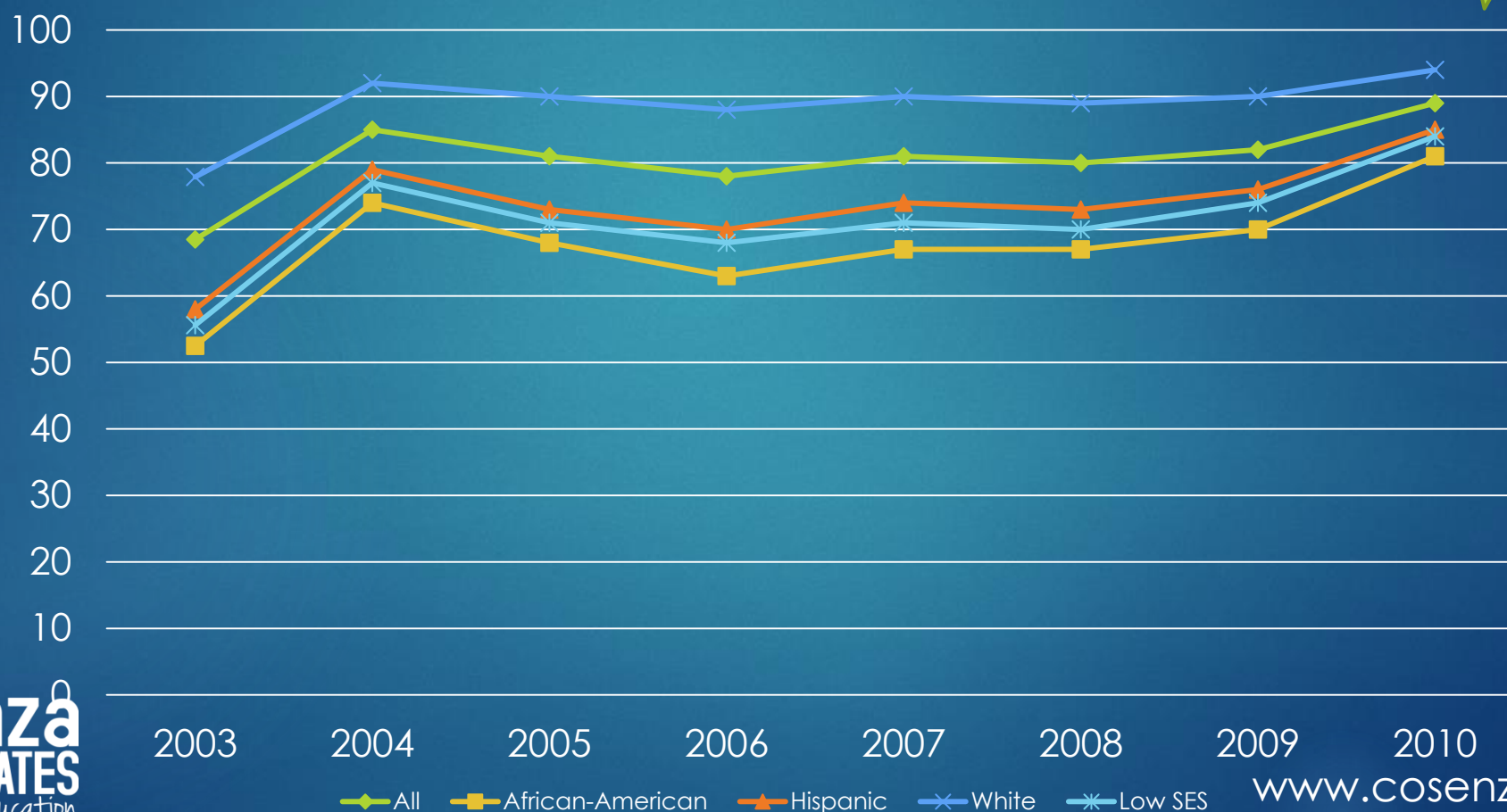
Student Performance, TAKS Math (Grade 8)



Texas Assessment of Knowledge and Skills (TAKS)

Primary
Admin
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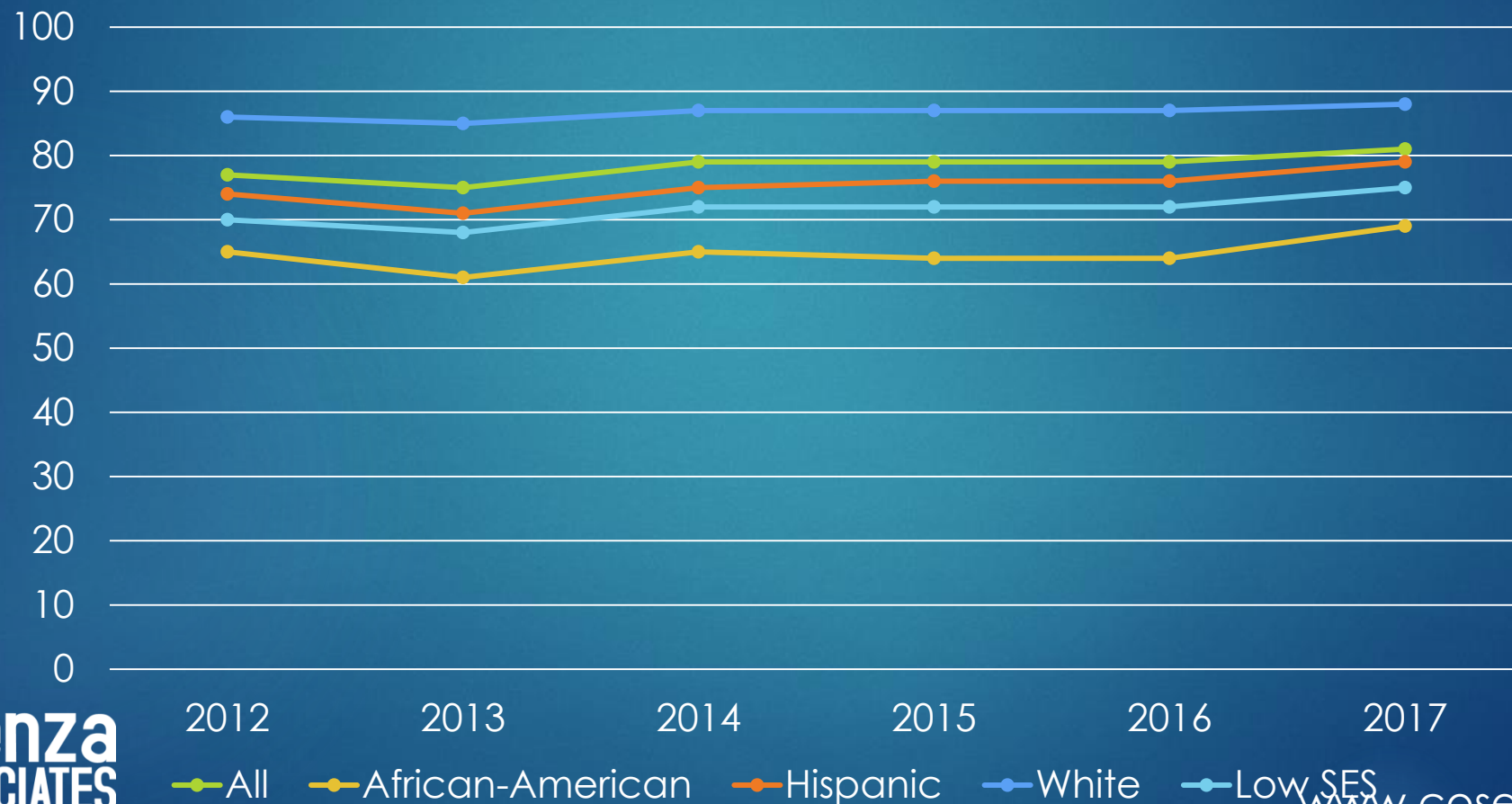
Student Performance, TAKS Math (Grade 11)



State of Texas Assessment of Academic Readiness (STAAR)

1st
Admin
only

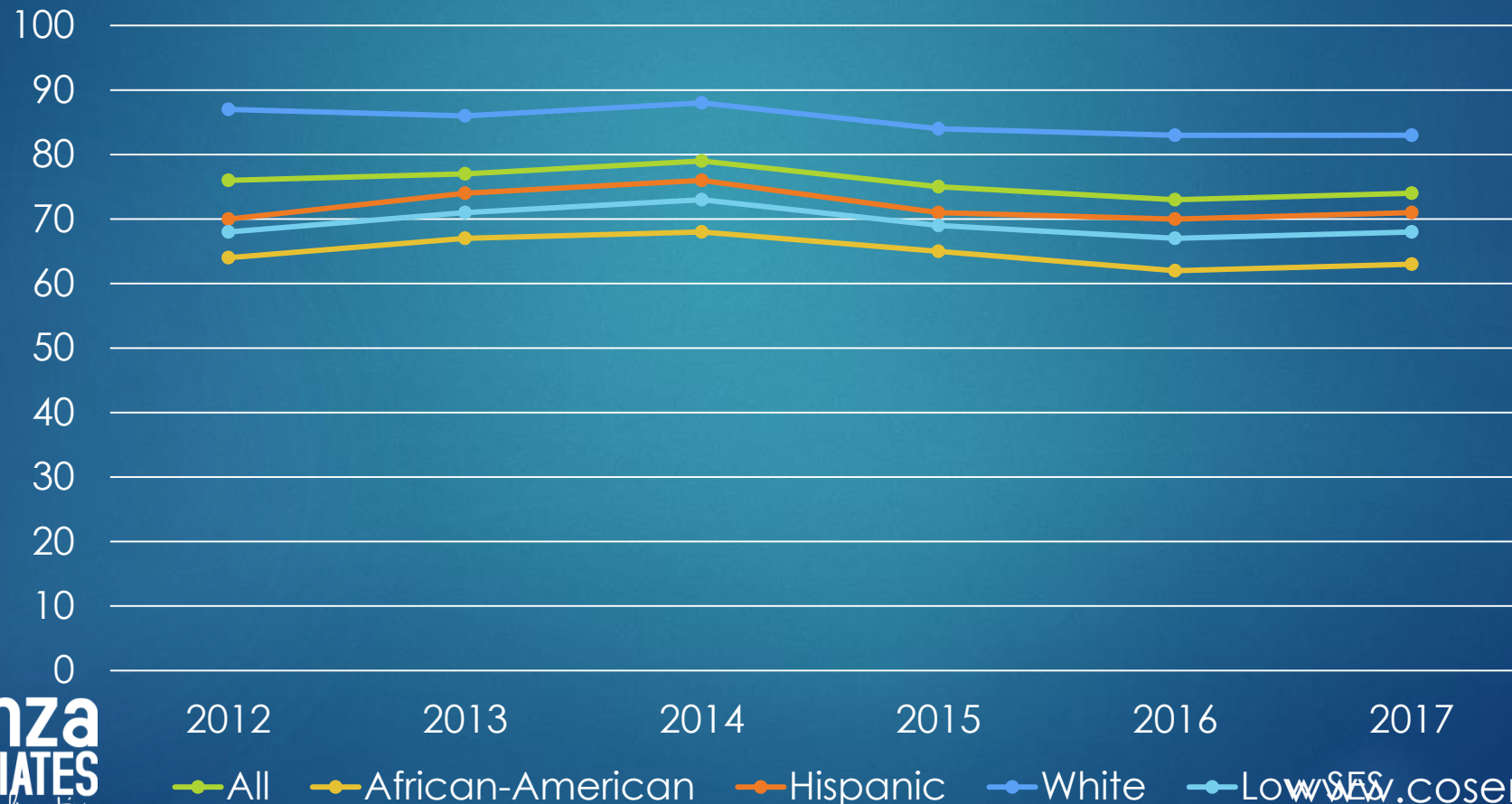
Student Performance, STAAR Math (Grade 5)



State of Texas Assessment of Academic Readiness (STAAR)

1st
Admin
only

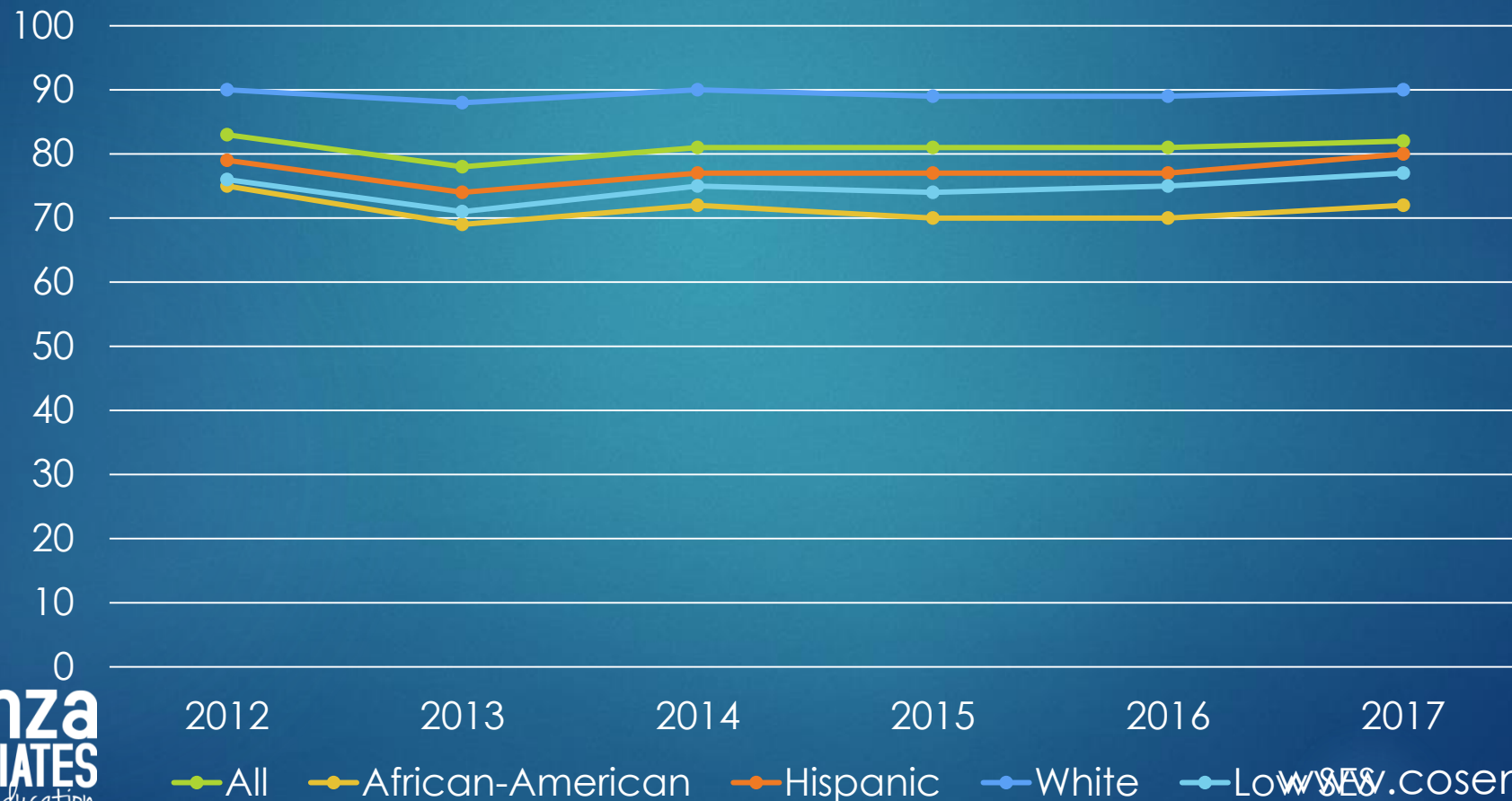
Student Performance, STAAR Math (Grade 8)

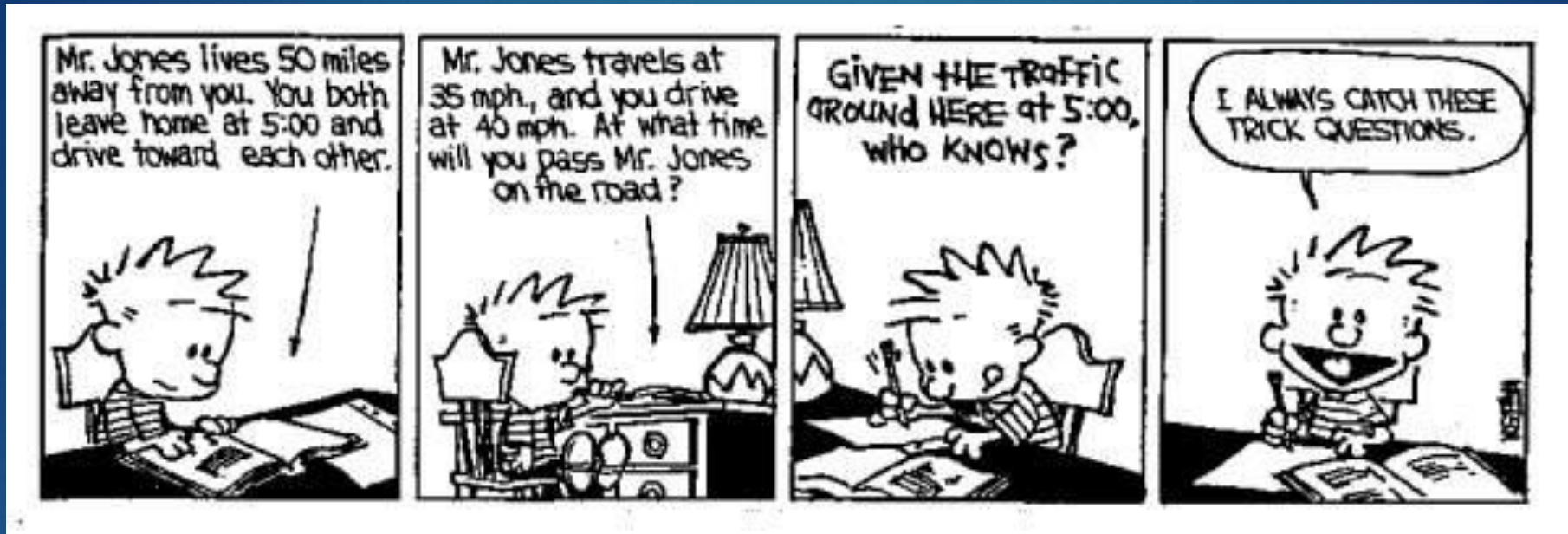


State of Texas Assessment of Academic Readiness (STAAR)

Spring
admin
only

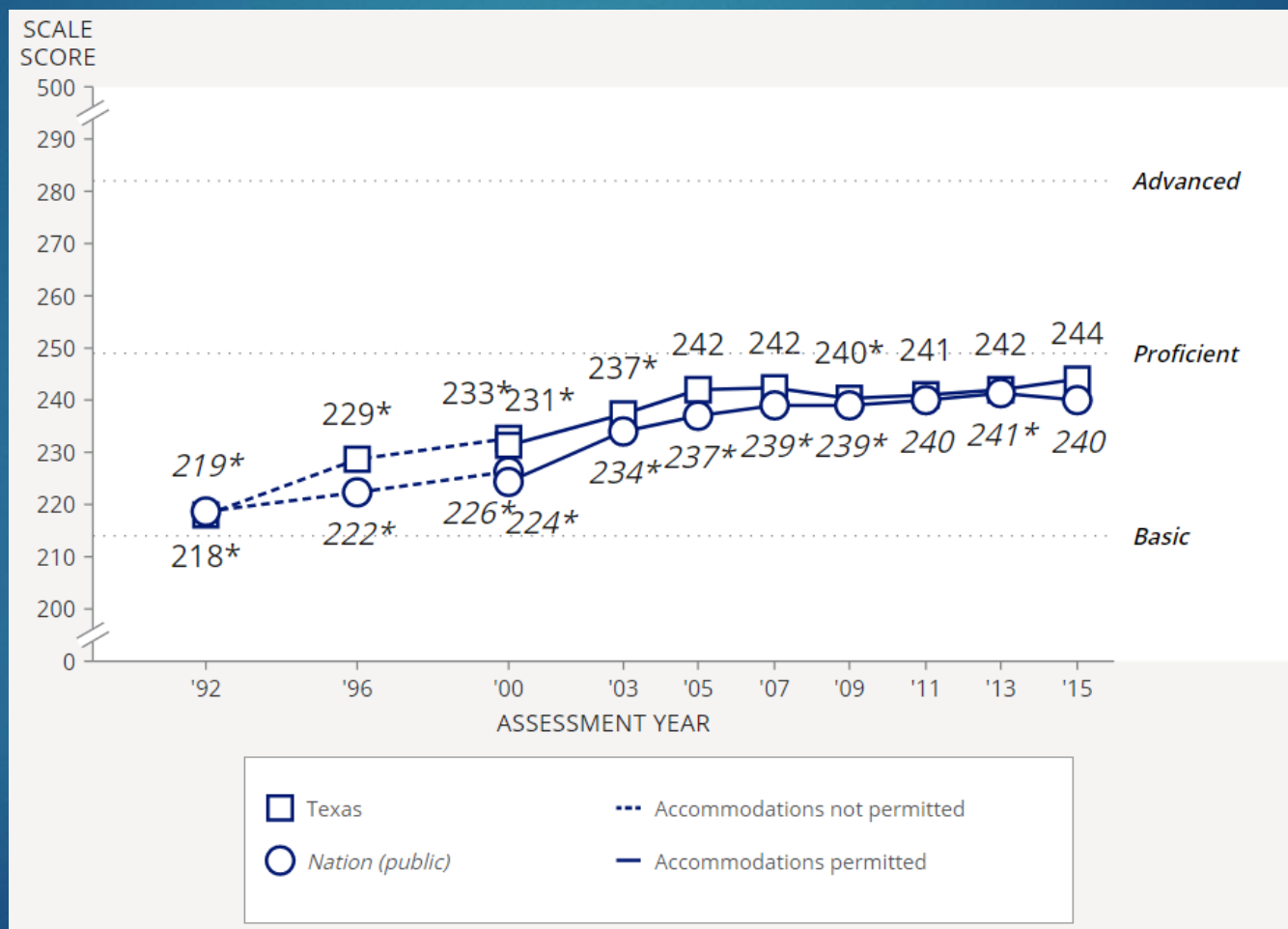
Student Performance, STAAR Math (Algebra 1)





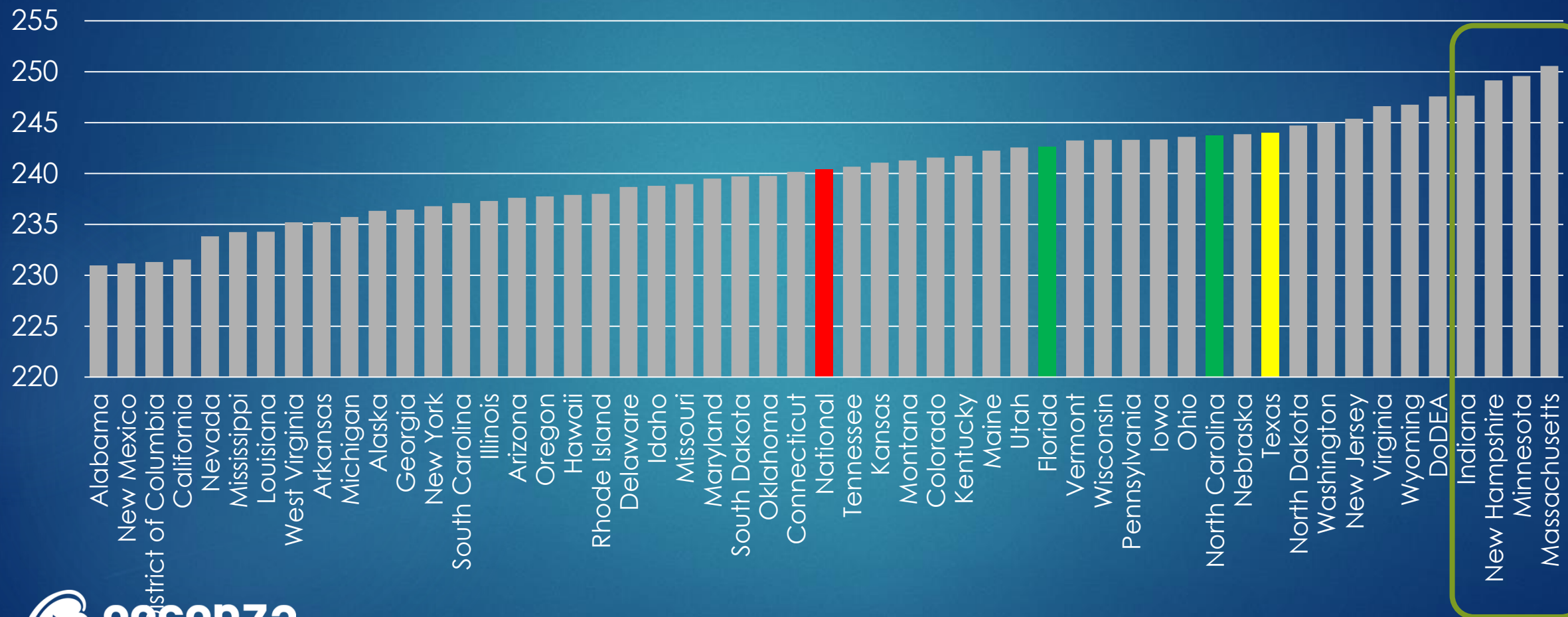
National Story of Math Assessment

National Assessment of Educational Progress (NAEP) – Grade 4



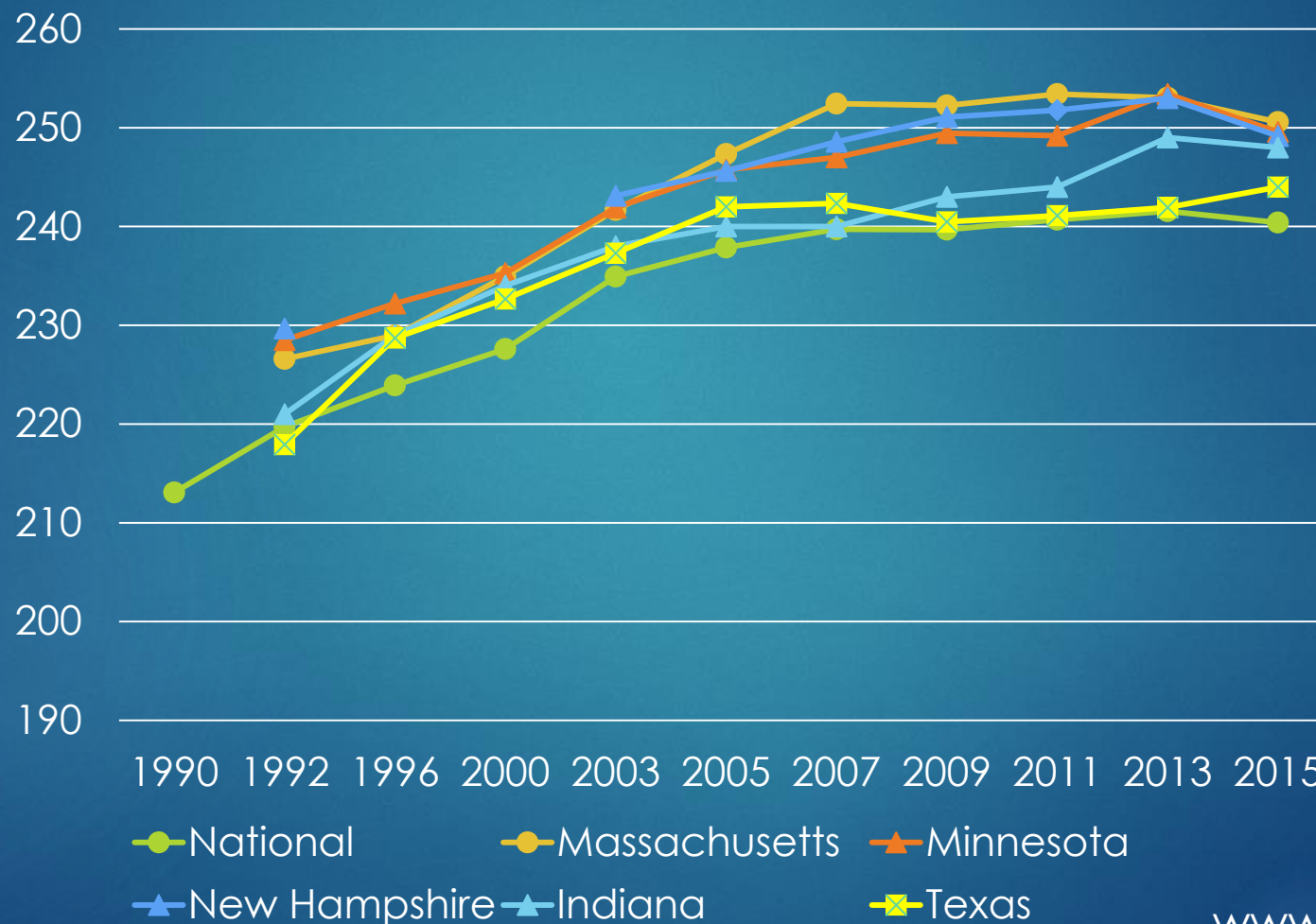
NAEP Grade 4 – State by State

NAEP Average Scale Score, Grade 4

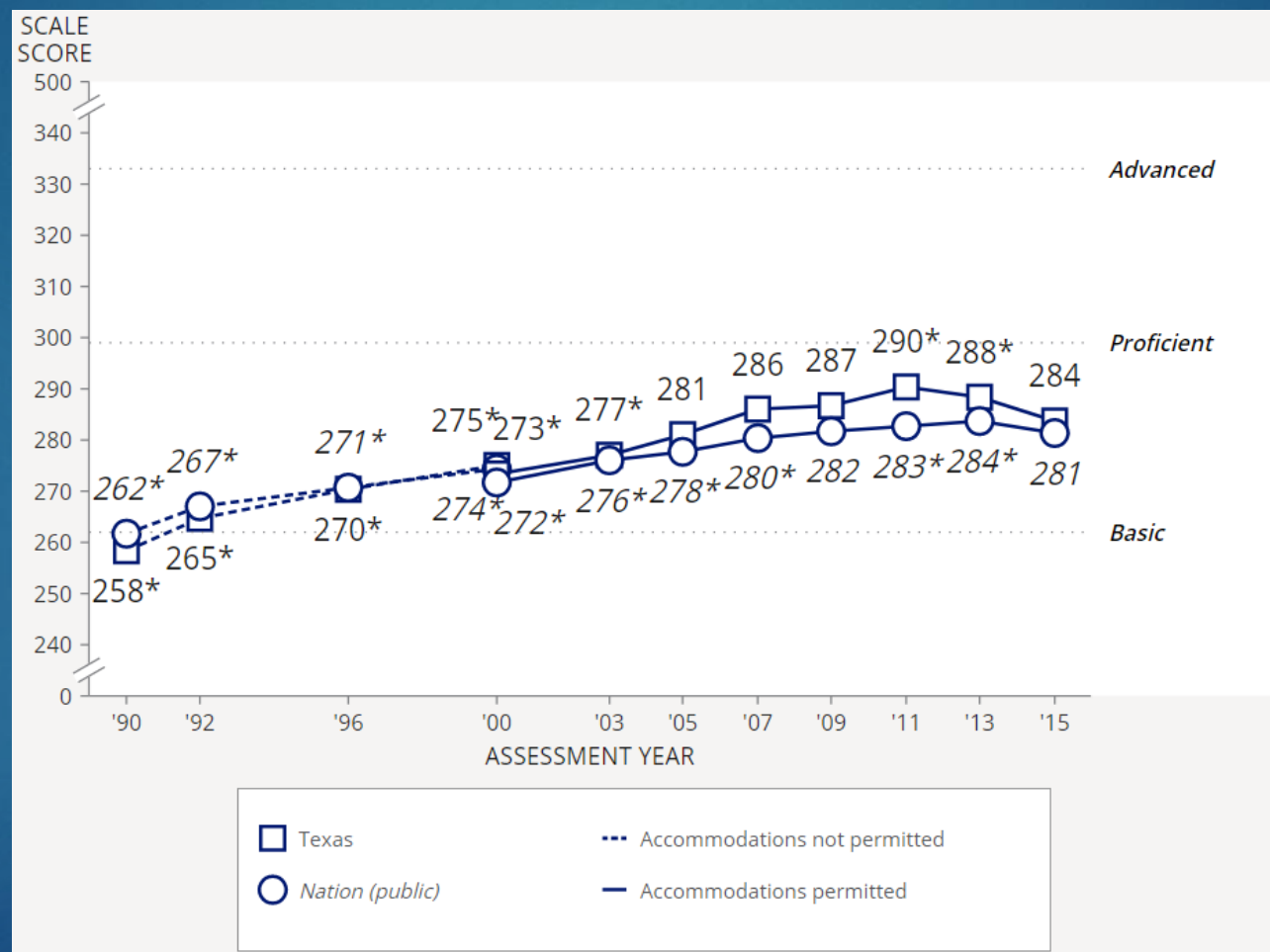


NAEP – Grade 4

NAEP Comparison: Texas, National, and High-Performing States

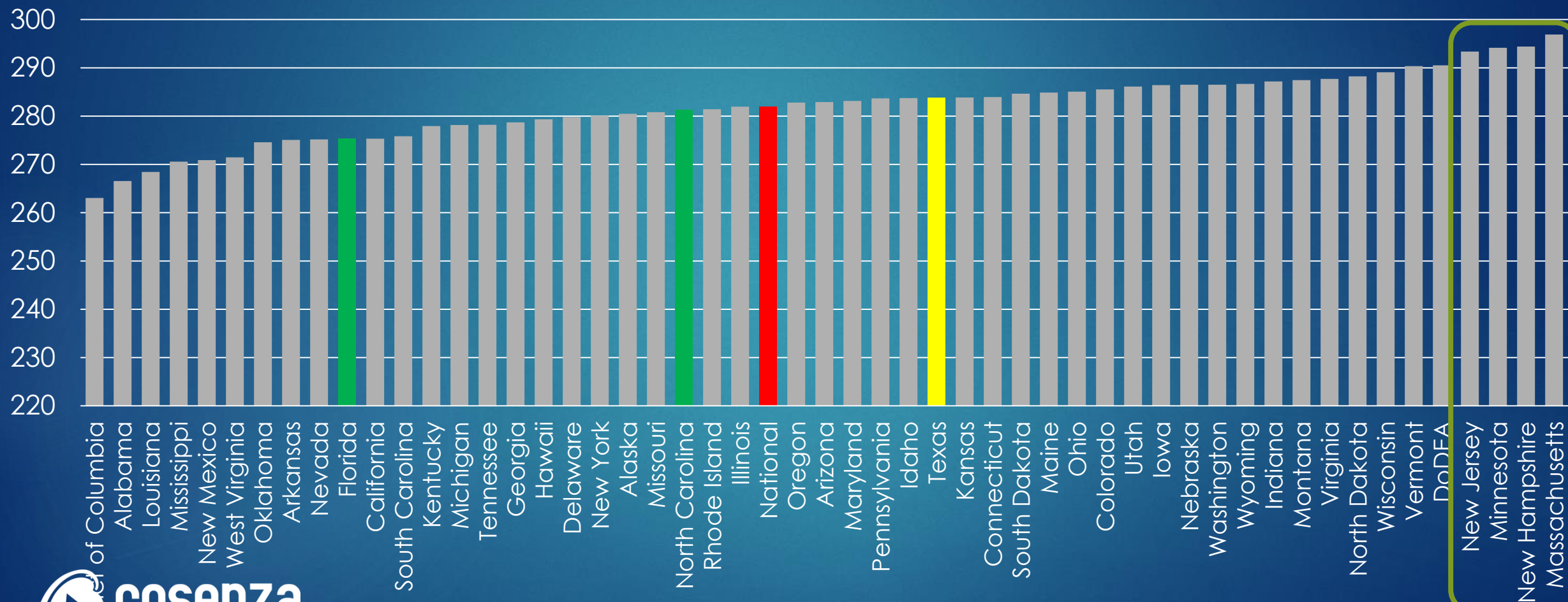


National Assessment of Educational Progress (NAEP) – Grade 8



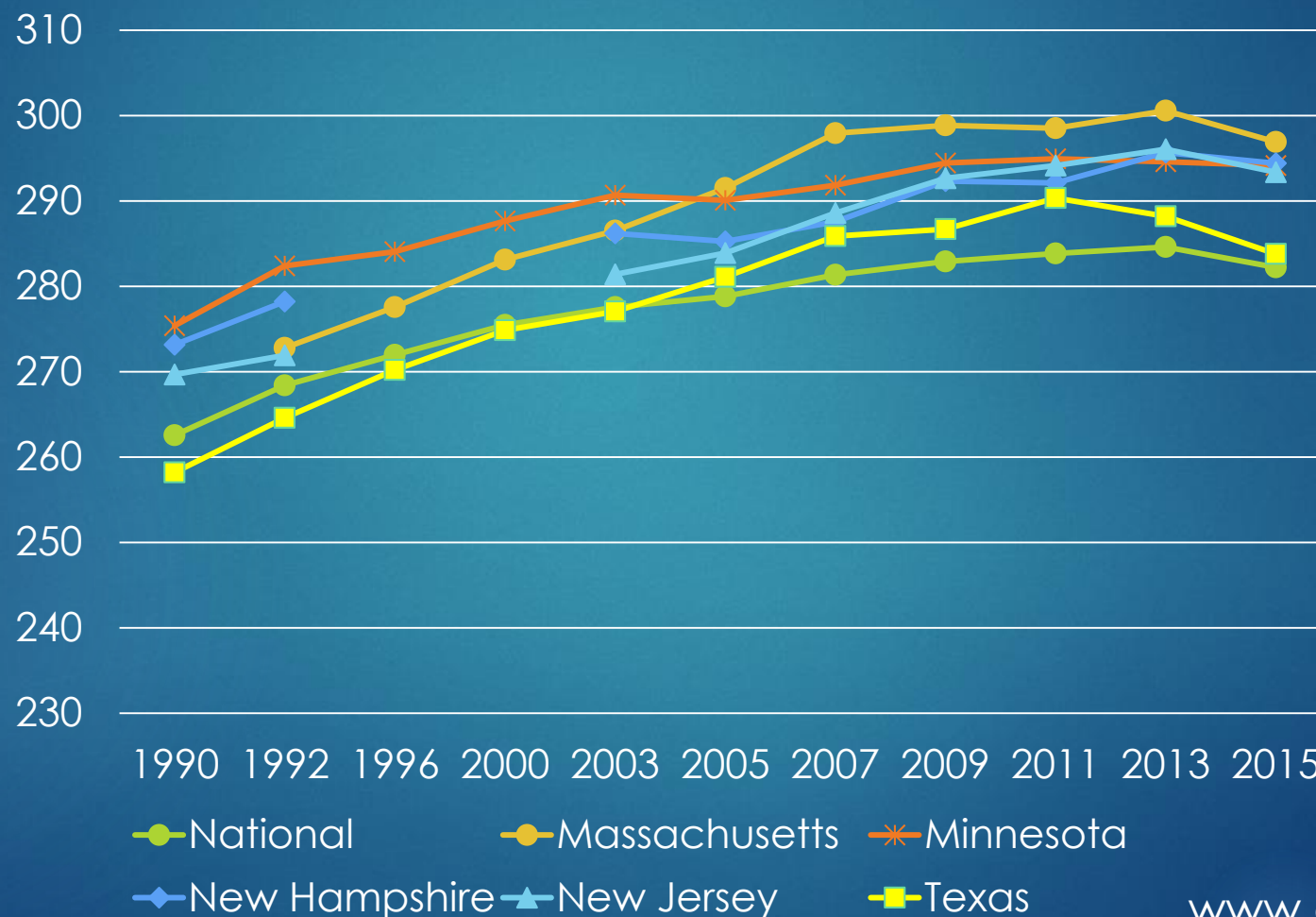
NAEP Grade 8 – State by State

NAEP Average Scale Score, Grade 8



NAEP – Grade 8

NAEP Comparison: Texas, National, and High-Performing States



International Story of Math Assessment

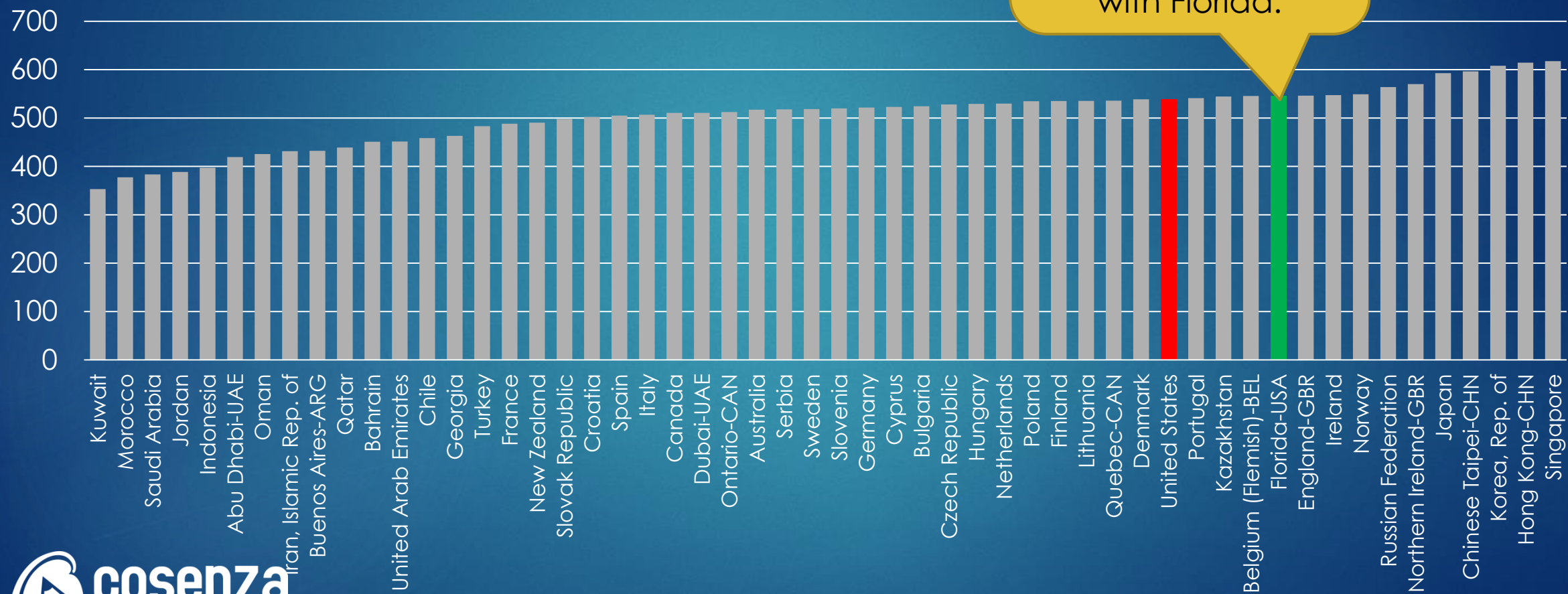


TIMSS

- ▶ Trends in International Mathematics and Science Studies
- ▶ Administered at Grade 4, 8, and 12
- ▶ Every 4 years, most recently in 2015
- ▶ 57 countries and 7 regions participated

TIMSS 2015, Grade 4

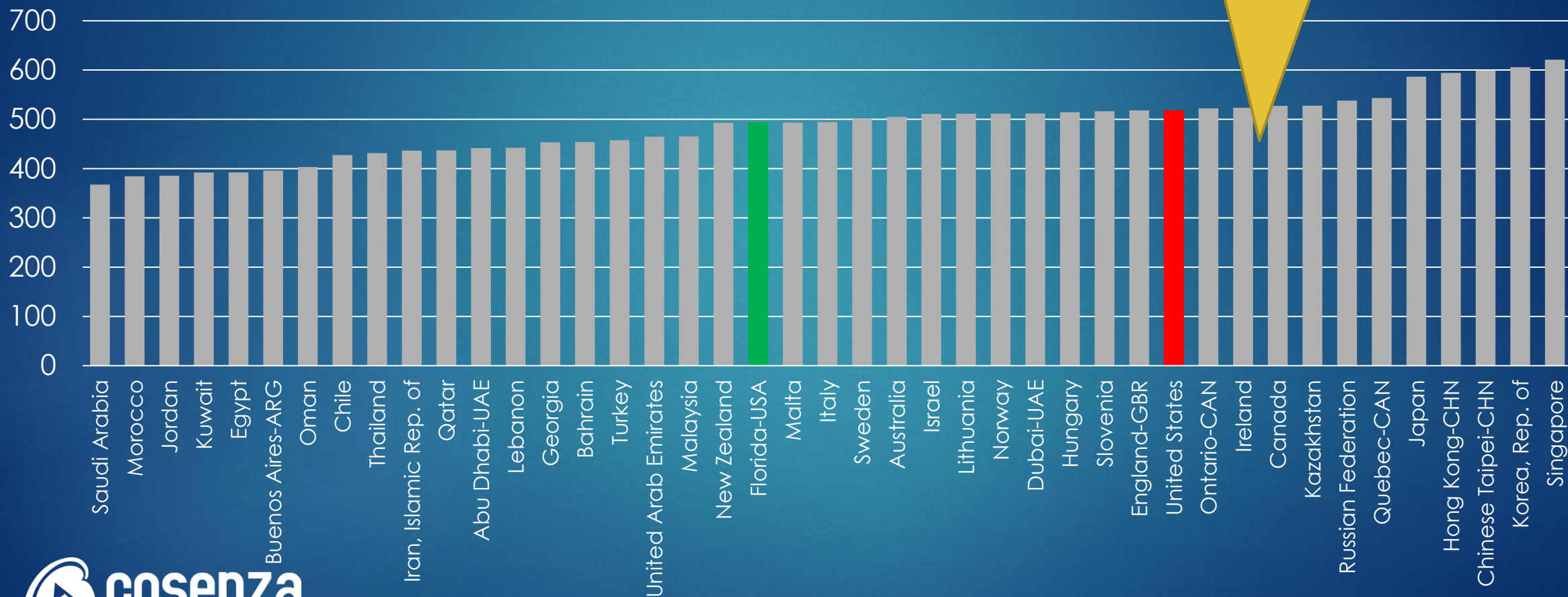
Average Scale Score by Country or Jurisdiction



TIMSS 2015, Grade 8

Average Scale Score by Country or Jurisdiction

Based on NAEP scores with Texas, Florida, and US avg., Texas would probably go here.

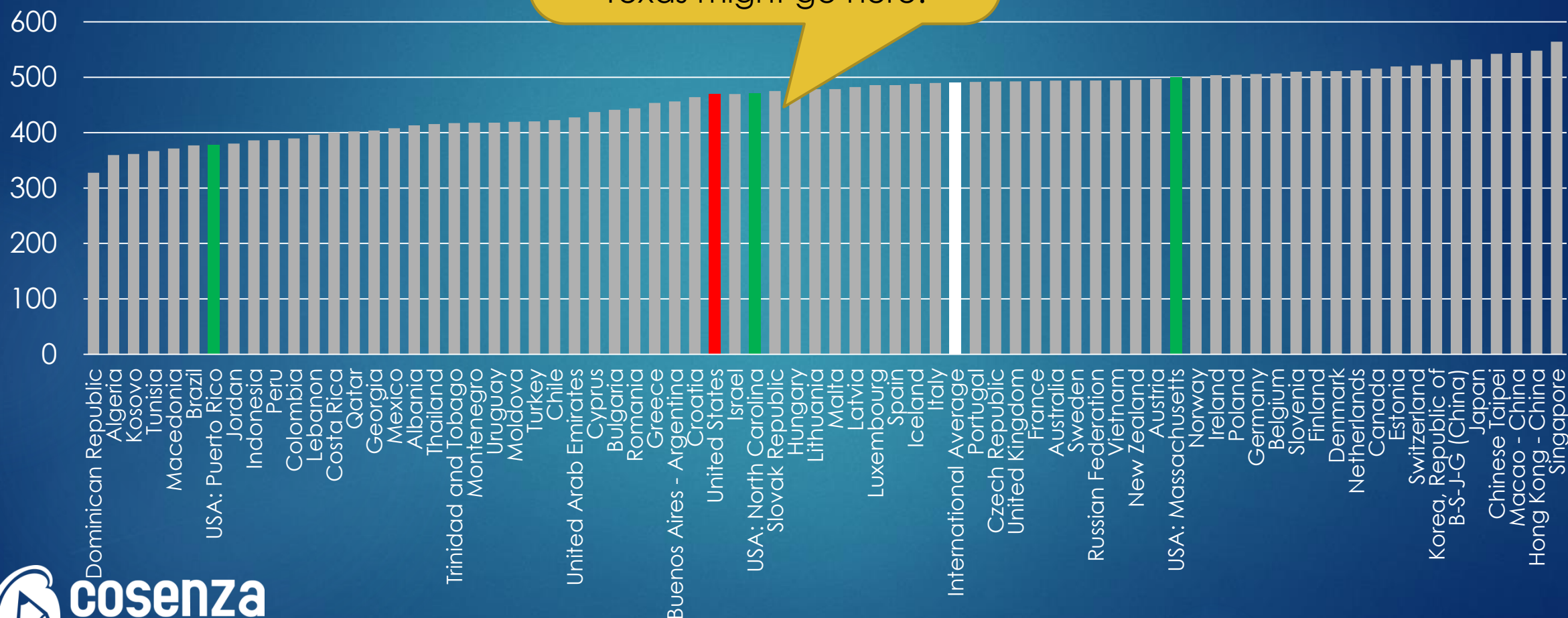


PISA

- ▶ Program for International Student Assessment
- ▶ Organization for Economic Cooperation and Development (OECD)
- ▶ Administered to 15-year-olds (Grade 10 in US)
- ▶ Every 3 years, most recently in 2015
- ▶ Over 70 countries and regions participated

PISA 2015, Grade 8

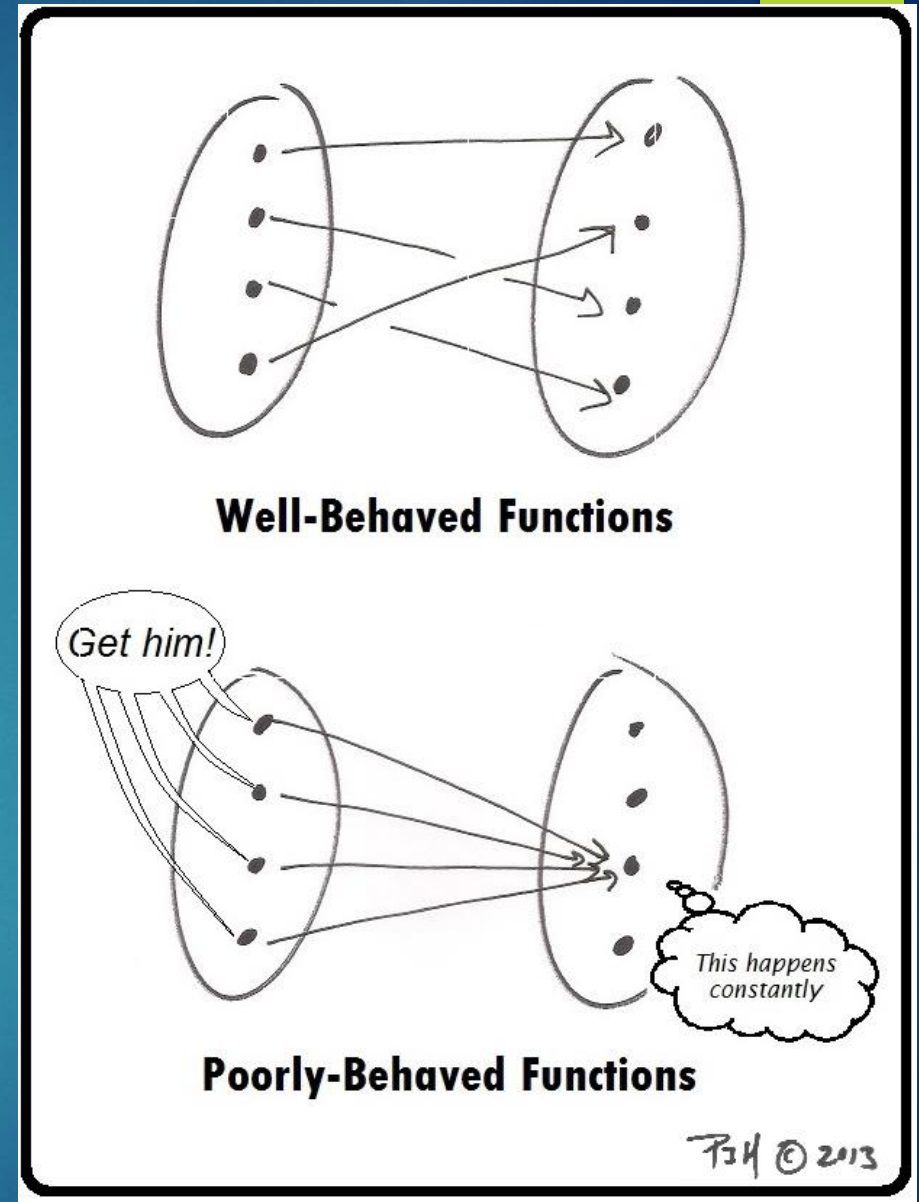
There is no direct comparison with high school scores in the US. Based on 8th grade NAEP, Texas might go here.



No one ever says to a teacher, "Wow, I remember that really cool worksheet we did!"

--Karen Karp, CAMT 2016 Opening Session

Sightseeing: STAAR, state test, NAEP, TIMSS Assessment Items



Grade 4: Perimeter

Texas: STAAR 2016

33 A rug shaped like a rectangle has a width of 3 m. The length of the rug is 2 m greater than its width. What is the perimeter of the rug in meters?

- A** 10 m
- B** 16 m
- C** 8 m
- D** 15 m

Minnesota, Grade 3

19. The perimeter of a rectangle is 16 inches.

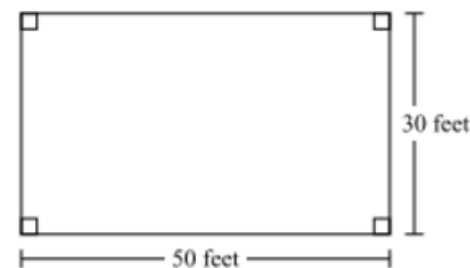
Its length is 5 inches.

What is its width?

- A.** 3 inches
- B.** 6 inches
- C.** 11 inches
- D.** 21 inches

Massachusetts, 2015

The length and width of a field are shown in the diagram below.



- a. What is the perimeter, in feet, of the field? Show or explain how you got your answer.
- b. What is the area, in square feet, of the field? Show or explain how you got your answer.

Both the length and the width of the field will be increased by 10 feet.

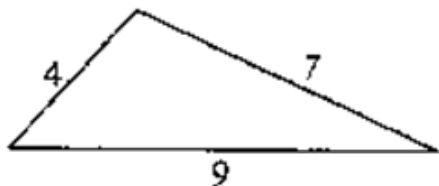
- c. What will be the new area, in square feet, of the field? Show or explain how you got your answer.

Grade 4: Perimeter

Texas: STAAR 2016

33 A rug shaped like a rectangle has a width of 3 m. The length of the rug is 2 m greater than its width. What is the perimeter of the rug in meters?

- A** 10 m
- B** 16 m
- C** 8 m
- D** 15 m



If both the square and the triangle above have the same perimeter, what is the length of each side of the square?

- A.** 4
- B.** 5
- C.** 6
- D.** 7

NAEP

NAEP

— **256 Determine perimeter of a rectangle**

QUESTION 2 -



A teacher drew this rectangle on a playground. Sam walked around the rectangle on the lines shown. How far did Sam walk?

- ☐ **A.** 14 feet
- ☐ **B.** 20 feet
- ☐ **C.** 28 feet
- ☐ **D.** 48 feet

Grade 4: Perimeter

Texas: STAAR 2016

33 A rug shaped like a rectangle has a width of 3 m. The length of the rug is 2 m greater than its width. What is the perimeter of the rug in meters?

- A** 10 m
- B** 16 m
- C** 8 m
- D** 15 m

TIMSS 2011

The school playground is a square. The playground is 100 meters long. Ruth walks all the way around the edge of the playground. How far does she walk?

- A. 100 meters
- B. 200 meters
- C. 400 meters
- D. 10,000 meters

Education system	Percent correct
Chinese Taipei-CHN	88 🏆
Hong Kong-CHN	82 🏆
Finland	70 🏆
Korea, Rep. of	70 🏆
Russian Federation	69 🏆
Japan	68 🏆
Turkey	68 🏆
Netherlands	65 🏆
Lithuania	62 🏆
Singapore	61 🏆
Slovak Republic	61 🏆
Czech Republic	60 🏆
Belgium (Flemish)-BEL	58 🏆
Malta	58 🏆
Sweden	57 🏆
Northern Ireland-GBR	57 🏆
Croatia	56 🏆
Austria	56 🏆
Azerbaijan	55
Germany	54 🏆
Thailand	54
Denmark	54 🏆
Kazakhstan	53
Poland	53
England-GBR	53
Australia	52
Romania	51
Portugal	51
Slovenia	50
Hungary	50
International average	50
Ireland	49
Iran, Islamic Rep. of	46
New Zealand	44 🏆
Italy	44 🏆
United States	43 🏆
Georgia	42 🏆
Armenia	41 🏆
Norway	41 🏆
Spain	38 🏆
Tunisia	38 🏆
Serbia	36 🏆
Chile	36 🏆
Saudi Arabia	35 🏆
United Arab Emirates	29 🏆
Bahrain	24 🏆
Oman	23 🏆
Qatar	22 🏆
Kuwait	21 🏆
Yemen	17 🏆
Morocco	15 🏆

Grades 6-8: Equivalent Expressions

Texas: Grade 6 STAAR 2016

9 Which two expressions are equivalent?

- A** $4 + (3 \cdot y)$ and $(4 + 3) \cdot y$
- B** $(18 \div y) + 10$ and $10 + (y \div 18)$
- C** $12 - (y \cdot 2)$ and $12 - (2 \cdot y)$
- D** $(10 - 6) \div y$ and $10 - (6 \div y)$

Massachusetts, Grade 6, 2015

Mason wrote the expression shown below.

$$5(y + 2)$$

Write an expression that is equivalent to Mason's expression.

Minnesota, Grade 8

13. Which property is used in the equation $mg + mh = m(g + h)$?

- A.** Associative
- B.** Commutative
- C.** Distributive
- D.** Identity

Grades 6-8: Equivalent Expressions

Texas: Grade 6 STAAR 2016

9 Which two expressions are equivalent?

- A $4 + (3 \cdot y)$ and $(4 + 3) \cdot y$
- B $(18 \div y) + 10$ and $10 + (y \div 18)$
- C $12 - (y \cdot 2)$ and $12 - (2 \cdot y)$
- D $(10 - 6) \div y$ and $10 - (6 \div y)$

NAEP, Grade 8

Which of the following is equal to $6(x + 6)$?

- A. $x + 12$
- B. $6x + 6$
- C. $6x + 12$
- D. $6x + 36$
- E. $6x + 66$

TIMSS, Grade 8

Which expression is equivalent to $12 + 4x$?

- A. $12 + x$
- B. $7 + x$
- C. $12 + 4x$
- D. $12x$

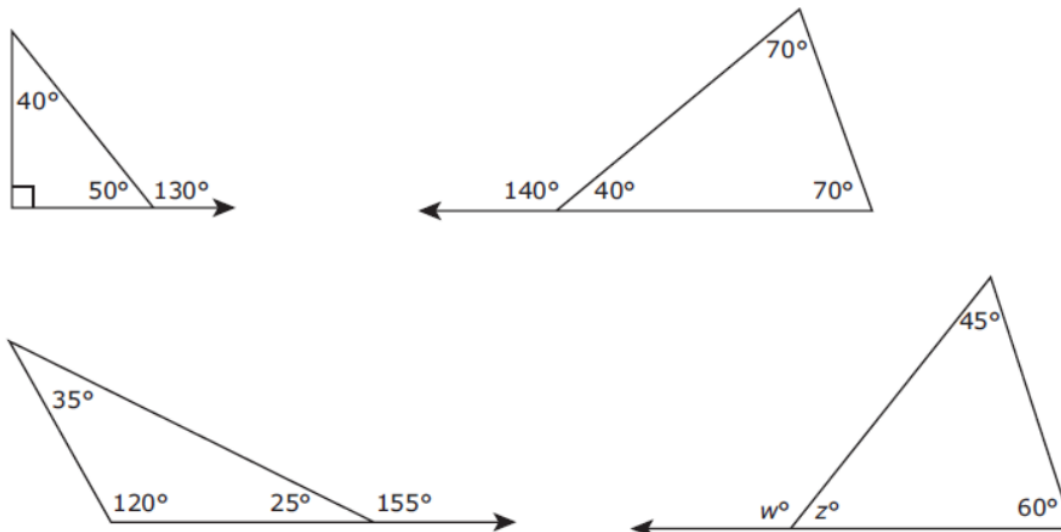
Overall Percent Correct

Education system	Percent correct
Singapore	89 ▲
Hong Kong-CHN	86 ▲
Korea, Rep. of	86 ▲
Chinese Taipei-CHN	85 ▲
Japan	82 ▲
Russian Federation	81 ▲
Lebanon	75 ▲
Israel	72 ▲
Ukraine	68 ▲
Kazakhstan	63 ▲
Armenia	62 ▲
Romania	62 ▲
Lithuania	58 ▲
Hungary	57 ▲
United States	53
Italy	52
Jordan	51
International average	51
Turkey	50
Qatar	49
Georgia	49
Syrian Arab Republic	48
Bahrain	47
Oman	46 ▼
Macedonia, Rep. of	45 ▼
Finland	44 ▼
Ghana	42 ▼
England-GBR	41 ▼
United Arab Emirates	40 ▼
Australia	40 ▼
Morocco	39 ▼
New Zealand	39 ▼
Palestinian Nat'l Auth.	38 ▼
Tunisia	37 ▼
Malaysia	37 ▼
Iran, Islamic Rep. of	36 ▼
Indonesia	36 ▼
Slovenia	34 ▼
Thailand	33 ▼
Saudi Arabia	28 ▼
Sweden	24 ▼
Chile	18 ▼
Norway	16 ▼

Grade 8: Angle Measures in Triangles

Texas: STAAR 2016

24 Four triangles are shown.

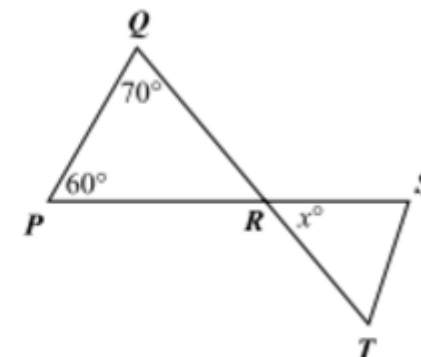


Based on these triangles, which statement is true?

- F $w = 75^\circ$, because $45 + 60 = 105$ and $180 - 105 = 75$
- G $w = 105^\circ$, because $180 - (45 + 60) = 75$ and $180 - 75 = 105$
- H $w = 285^\circ$, because $45 + 60 = 105$ and $105 + 180 = 285$
- J $w = 165^\circ$, because $180 - 60 = 120$ and $120 + 45 = 165$

Massachusetts, 2014 (no calculator)

Triangle PQR , triangle RST , and two angle measures are shown below.



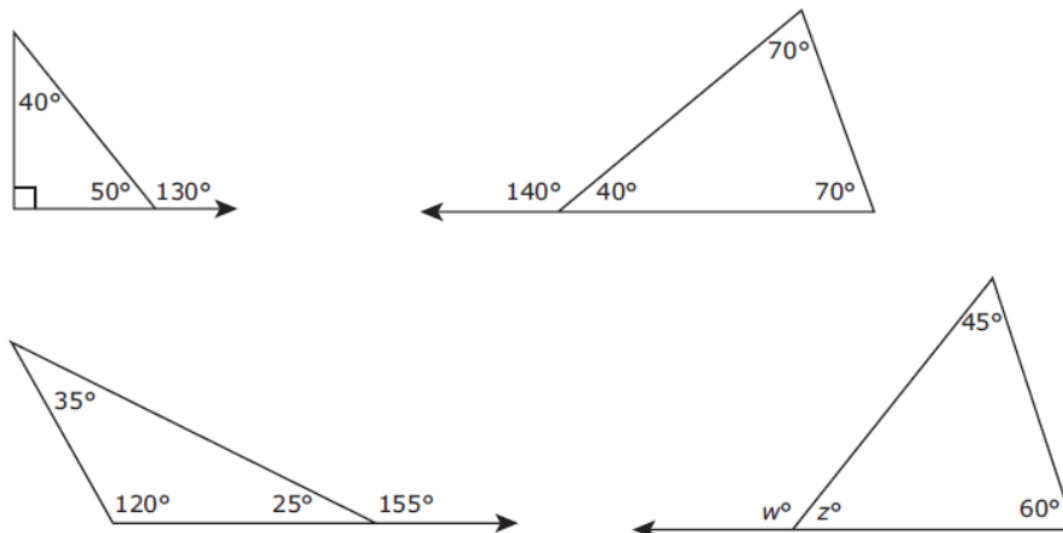
Line segment QT intersects line segment PS at point R .

What is the value of x ?

Grade 8: Angle Measures in Triangles

Texas: STAAR 2016

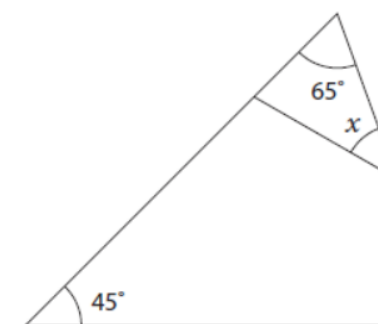
24 Four triangles are shown.



Based on these triangles, which statement is true?

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- G $w = 105^\circ$, because $180 - (45 + 60) = 75$ and $180 - 75 = 105$
- H $w = 285^\circ$, because $45 + 60 = 105$ and $105 + 180 = 285$
- J $w = 165^\circ$, because $180 - 60 = 120$ and $120 + 45 = 165$

TIMSS 2011



In the figure above, what is the value of x ?

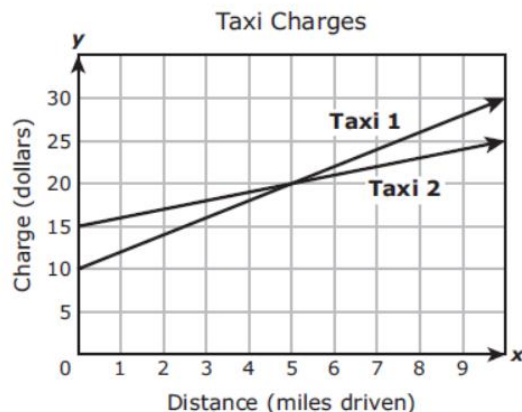
- A. 30°
- B. 40°
- C. 45°
- D. 65°

Education system	Percent correct
Singapore	83
Japan	81
Korea, Rep. of	81
Hong Kong-CHN	79
Chinese Taipei-CHN	76
Russian Federation	58
Lebanon	52
Kazakhstan	50
Italy	50
Finland	49
Malaysia	49
Israel	49
Hungary	49
Turkey	48
Lithuania	46
International average	46
England-GBR	44
Ukraine	43
New Zealand	43
Australia	43
Sweden	43
Thailand	42
United States	42
Ghana	42
Armenia	41
Saudi Arabia	41
Jordan	40
Slovenia	40
Iran, Islamic Rep. of	39
United Arab Emirates	38
Indonesia	37
Chile	37
Norway	36
Oman	35
Georgia	35
Bahrain	33
Qatar	33
Romania	33
Macedonia, Rep. of	33
Morocco	32
Syrian Arab Republic	32
Palestinian Nat'l Auth.	31
Tunisia	27

Grade 8: Simultaneous Linear Functions

Texas: STAAR 2016

- 50 The graph models the linear relationship between the charge for a trip and the number of miles driven for two taxis.



Based on the graph, which statement appears to be true?

- F The charge for a trip with a distance of 5 miles is \$5 greater for Taxi 1 than for Taxi 2.
- G The charge for a trip with a distance of 5 miles is \$5 less for Taxi 1 than for Taxi 2.
- H The charge for a trip with a distance of 5 miles is \$20 for both Taxi 1 and Taxi 2.
- J The charge for a trip with a distance of 5 miles cannot be determined for either Taxi 1 or Taxi 2.

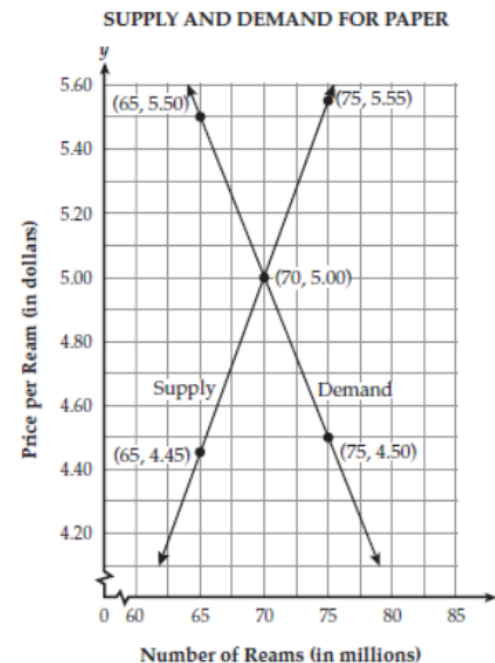
Florida: FCAT 2.0 Sample Item

- 8 An economist is helping a paper company evaluate the demand for reams of paper at different selling prices. The point at which the supply and demand graphs intersect is referred to as *market equilibrium*.

The economist graphed the supply and demand equations shown below.

Demand equation: $y = -0.1x + 12$

Supply equation: $y = 0.11x - 2.7$

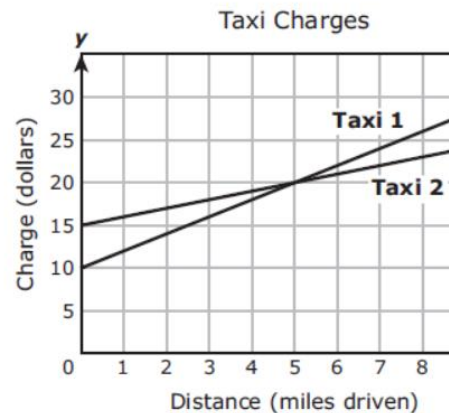


What is the price per ream, in dollars, of the *market equilibrium*?

Grade 8: Simultaneous Linear Functions

Texas: STAAR 2016

50 The graph models the linear relationship between the charge for a trip and the number of miles driven for two taxis.



Based on the graph, which statement appears to be true?

- F The charge for a trip with a distance of 5 miles is \$20 for Taxi 1.
- G The charge for a trip with a distance of 5 miles is \$20 for Taxi 2.
- H The charge for a trip with a distance of 5 miles is \$20 for both taxis.
- J The charge for a trip with a distance of 5 miles is \$20 for Taxi 2.

Massachusetts, 2016 (no calculator)

2016 Spring Release, Mathematics - Grade 8
Question 4: Multiple-Choice

Reporting Category: Expressions and Equations

Standard: CCSS.Math.Content.8.EE.C.8 - Analyze and solve pairs of simultaneous linear equations.

What are the solutions to the system of equations below?

$$3y = x - 2$$

$$y = -2x + 4$$

36 A system of equations is shown below.

$$2x + 4y = 0$$

$$y = \frac{1}{2}x - 3$$

What is the x-value in the solution to the system of equations?

- A -3
- B -1.5
- C 1.5
- D 3

North Carolina (calculator)

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BC

HOW MUCH IS 43.789 TIMES 5.221 ?

228.622.369.

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6.1

NOT ONLY ARE RABBITS CUTE. THEY HAVE THE ABILITY TO MULTIPLY AT AMAZING SPEED.

WALT

Analysis and Implications

Comparing Texas Students with Other States

- ▶ Texas students, at Grades 4 and 8, perform above the national average.
 - ▶ At Grade 8, that difference is not significant.
- ▶ States such as Massachusetts, Minnesota, and New Hampshire consistently outperform Texas. What are they doing that we aren't?
 - ▶ Emphasizing problem-solving
 - ▶ Balancing conceptual development with skills development

Comparing Texas Students with Other States

- ▶ Since 2011, there has been a national downward trend in NAEP math scores. For Texas, Grade 8 scores are falling faster than the nation's.
 - ▶ 2011: \$5.4 billion budget cut for schools
 - ▶ State funding increases aren't keeping pace with enrollment growth → reduction in spending per student
 - ▶ Personnel reduction (specialists and other human resources)

Comparing Texas Students with Other Nations

- ▶ At Grades 4 and 8, Texas is like the United States – not performing well, but not performing poorly.
- ▶ At Grade 10, Texas, like the United States, performs lower than the OECD average.
- ▶ What are the consistently high-performing countries (Singapore, South Korea, Japan, Taiwan, certain Chinese areas) doing that we aren't? What can we learn from them?
- ▶ What mathematical processes (such as problem-solving) are high-performing countries using that we aren't?

Thank You!

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