



# Highlights from TIMSS 2011

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# Overview

- ❖ What is TIMSS and which education systems participate in it?
- ❖ How are U.S. students performing compared to their international peers in:
  - ❖ 4th-grade mathematics?
  - ❖ 8th-grade mathematics?
- ❖ How are students performing in participating U.S. states?



# What are...?

## TIMSS

- Trends in International Mathematics and Science Study (TIMSS)
- 4th- and 8th-grade mathematics and science assessment
- Developed by the TIMSS & PIRLS International Study Center at Boston College, under contract to the International Association for the Evaluation of Educational Achievement (IEA)



# TIMSS participating education systems (in either/both grades)



74 education systems

2011

Focus on Mathematics

# Participating states

- 9 states participated as separate entities to obtain scores in PIRLS or TIMSS or both

TIMSS grade 4	TIMSS grade 8
Florida North Carolina	Florida North Carolina Alabama California Colorado Connecticut Indiana Massachusetts Minnesota

- Each participated as part of the nation and on its own
- NCES funded participation at grade 8 of all states except Florida as part of a study to statistically link NAEP (National Assessment of Educational Progress) and TIMSS (Florida received other Education Department funding)

# U.S. national sample size

## **TIMSS**

### **4th grade**

Schools: 369

Students: 12,569

### **8th grade**

Schools: 501

Students: 10,477

# U.S. state sample sizes

(public schools only)

## TIMSS

### 4th grade

(FL, NC)

Schools: 46 – 77

Students:

1,792 – 2,661

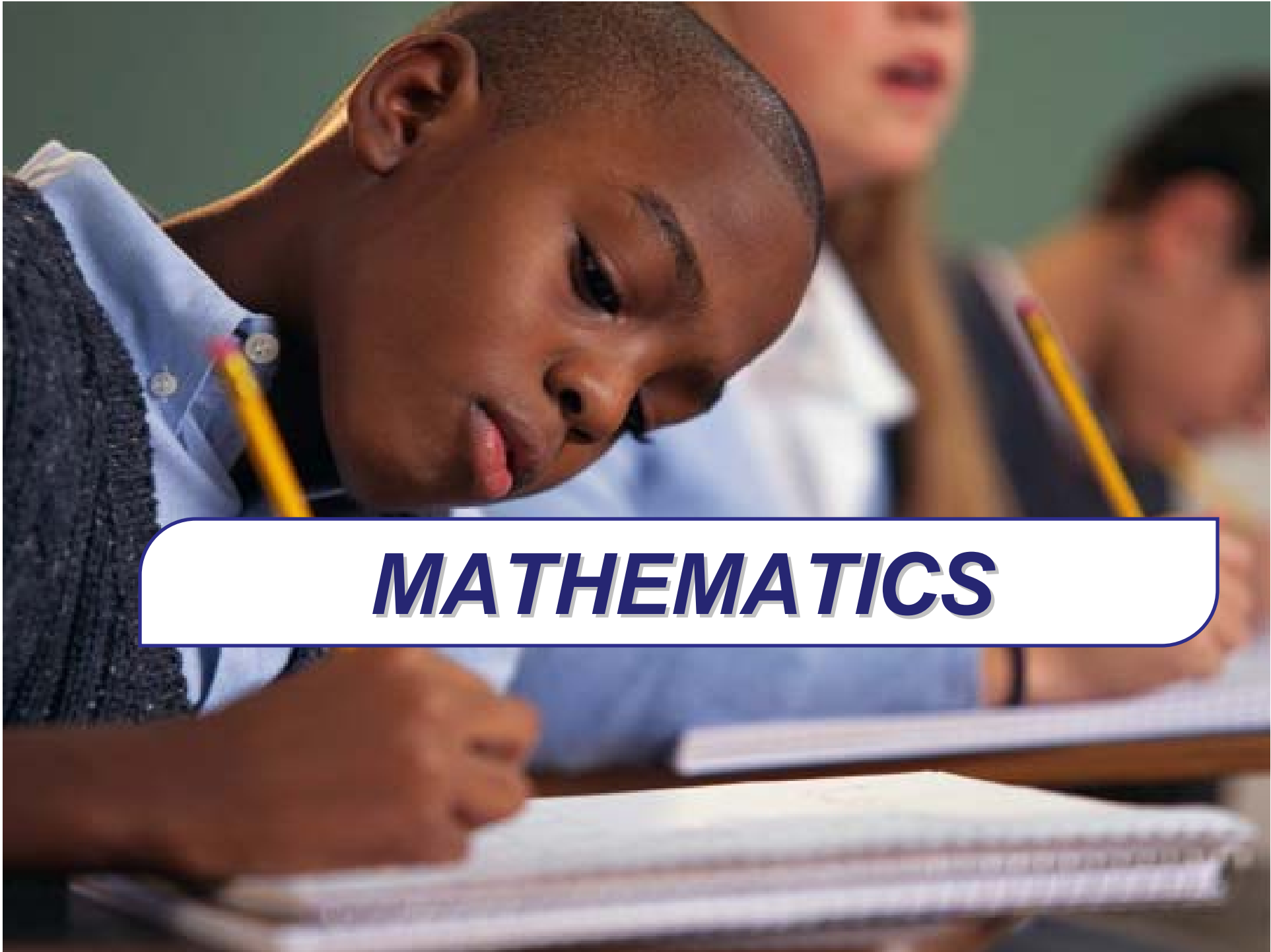
### 8th grade

(AL, CA, CO, CT, FL, IN, MA, MN, NC)

Schools: 53 – 82

Students:


1,712 – 2,614



***MATHEMATICS***

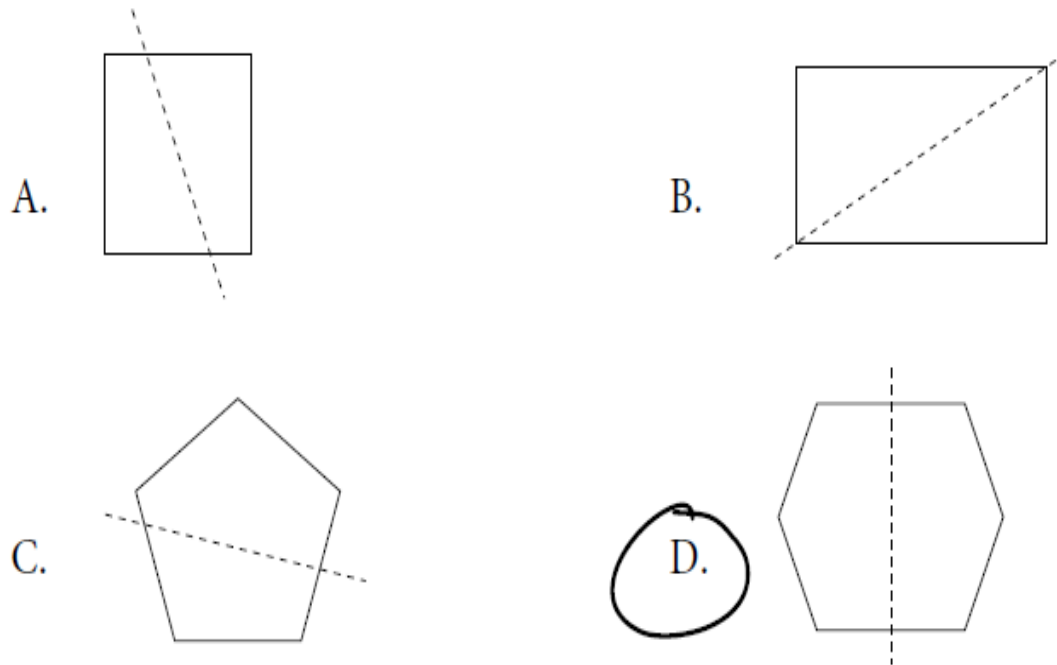


# TIMSS 2011 mathematics framework

	<b>TIMSS mathematics</b>	
<b>Content dimensions</b>	<u>Grade 4</u> Number Geometric Shapes and Measures Data Display  <u>Grade 8</u> Number Algebra Geometry Data and Chance	
<b>Cognitive dimensions</b>	Knowing Applying Reasoning	

# What is on the TIMSS mathematics assessment?

In which of the following figures is the dotted line a line of symmetry?



GRADE 4

Percentage of 4th-graders answering correctly:  
U.S.: 80%  
Int'l Avg.: 54%

# What is on the TIMSS mathematics assessment?

GRADE 4

Ingredients	
Eggs	4
Flour	8 cups
Milk	$\frac{1}{2}$ cup

The above ingredients are used to make a recipe for 6 people. Sam wants to make this recipe for only 3 people.

Complete the table below to show what Sam needs to make the recipe for 3 people. The number of eggs he needs is shown.

Ingredients	
Eggs	2
Flour	<u>4</u> cups
Milk	$\frac{1}{4}$ cup

Percentage of 4th-graders answering correctly:  
U.S.: 76%  
Int'l Avg.: 65%

# What is on the TIMSS mathematics assessment?



GRADE  
8

$$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$$

A. What is the next term in this pattern?

Answer:          $\frac{6}{7}$         

Percentage of 8th-graders answering correctly:  
U.S.: 87%  
Int'l Avg.: 70%

# What is on the TIMSS mathematics assessment?



GRADE  
8

There are 10 marbles in a bag: 5 red, and 5 blue.

Sue draws a marble from the bag at random. The marble is red.

She puts the marble back into the bag.

What is the probability that the next marble she draws at random is red?

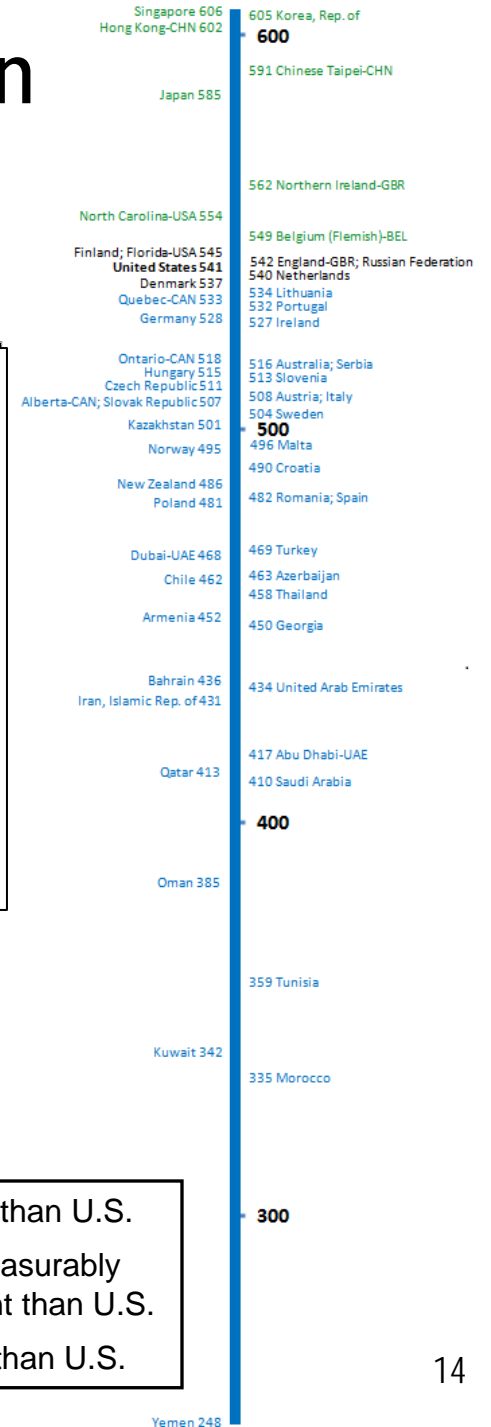
- A.  $\frac{1}{2}$
- B.  $\frac{4}{10}$
- C.  $\frac{1}{5}$
- D.  $\frac{1}{10}$

Percentage of 8th-  
graders answering  
correctly:  
U.S.: 66%  
Int'l Avg.: 45%



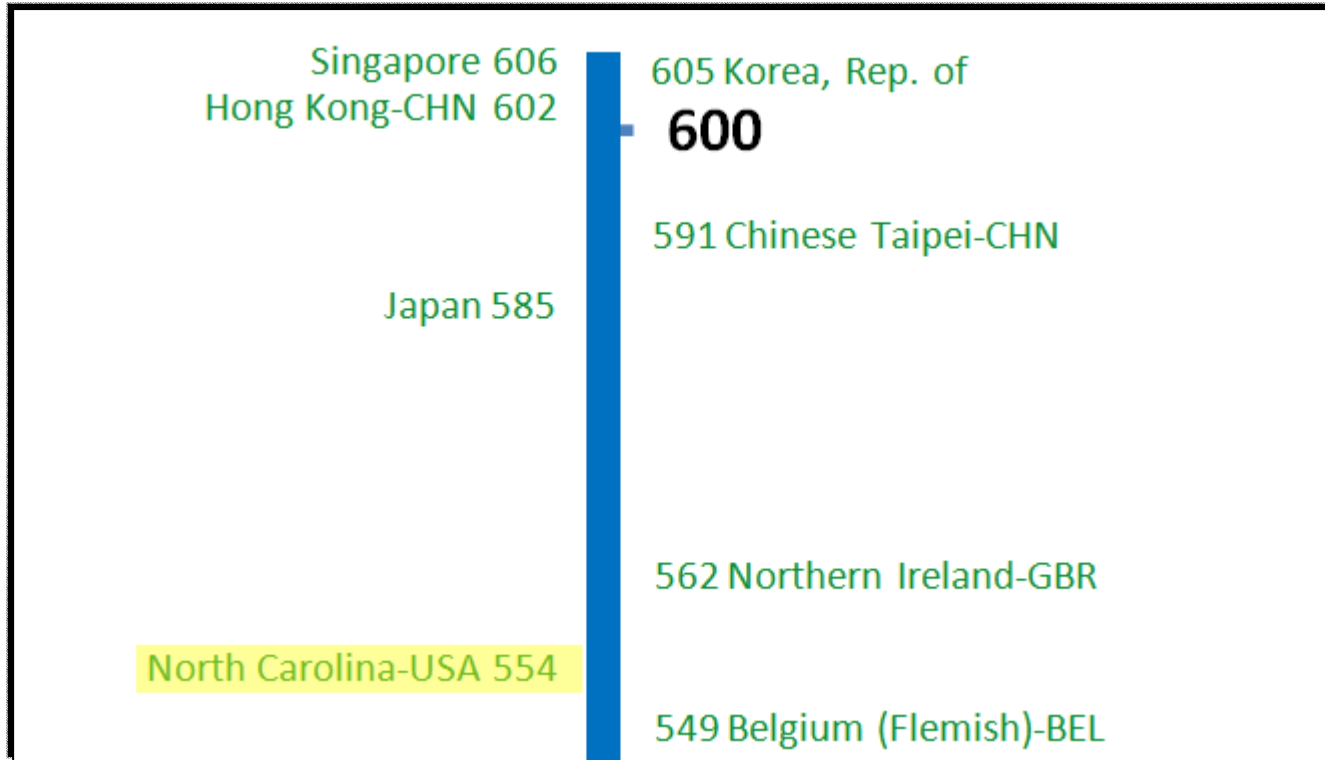
# U.S. average score (541) higher than the TIMSS scale average (500)

<b>UNITED STATES 541</b>	<b>542 England-GBR; Russian Federation</b>
Denmark 537	<b>540 Netherlands</b>
Quebec-CAN 533	534 Lithuania
Germany 528	532 Portugal
	527 Ireland
Ontario-CAN 518	516 Australia; Serbia
Hungary 515	513 Slovenia
Czech Republic 511	508 Austria; Italy
Alberta-CAN; Slovak Republic 507	504 Sweden
Kazakhstan 501	<b>500</b>



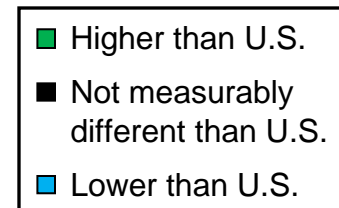
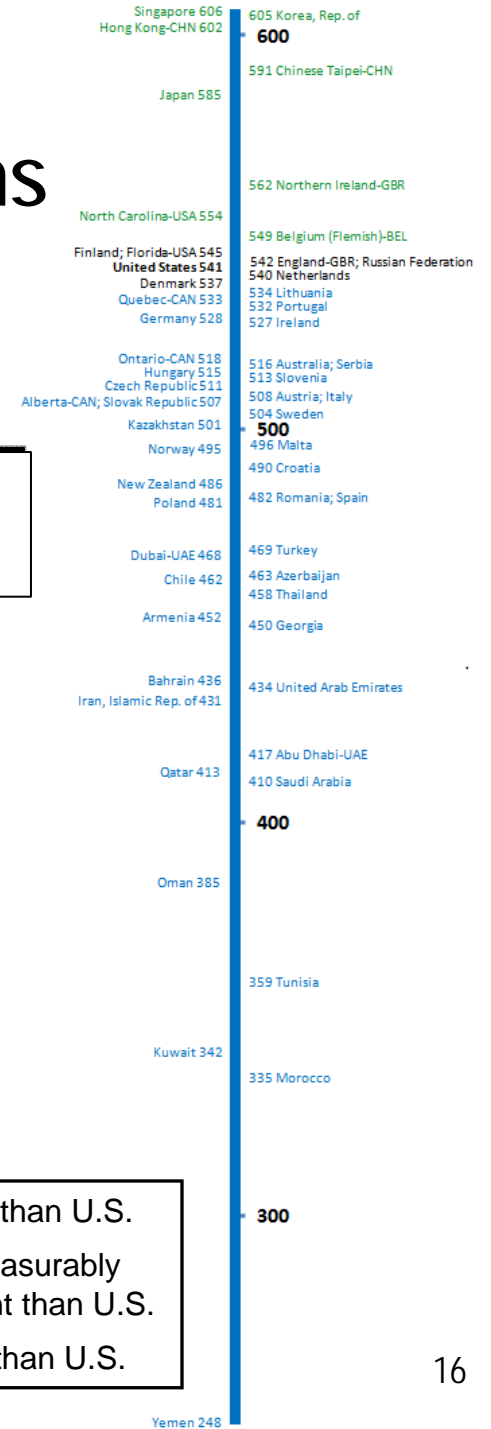
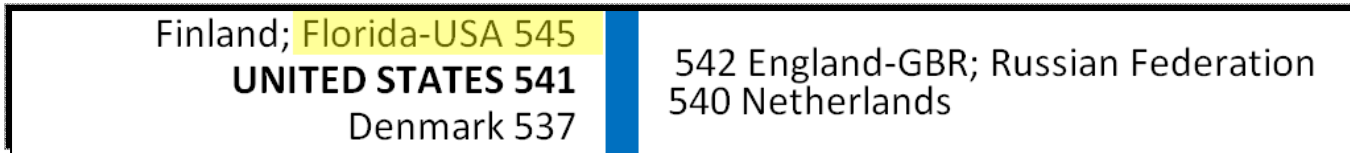
- Higher than U.S.
- Not measurably different than U.S.
- Lower than U.S.

# U.S. average score (541) lower than in 8 education systems



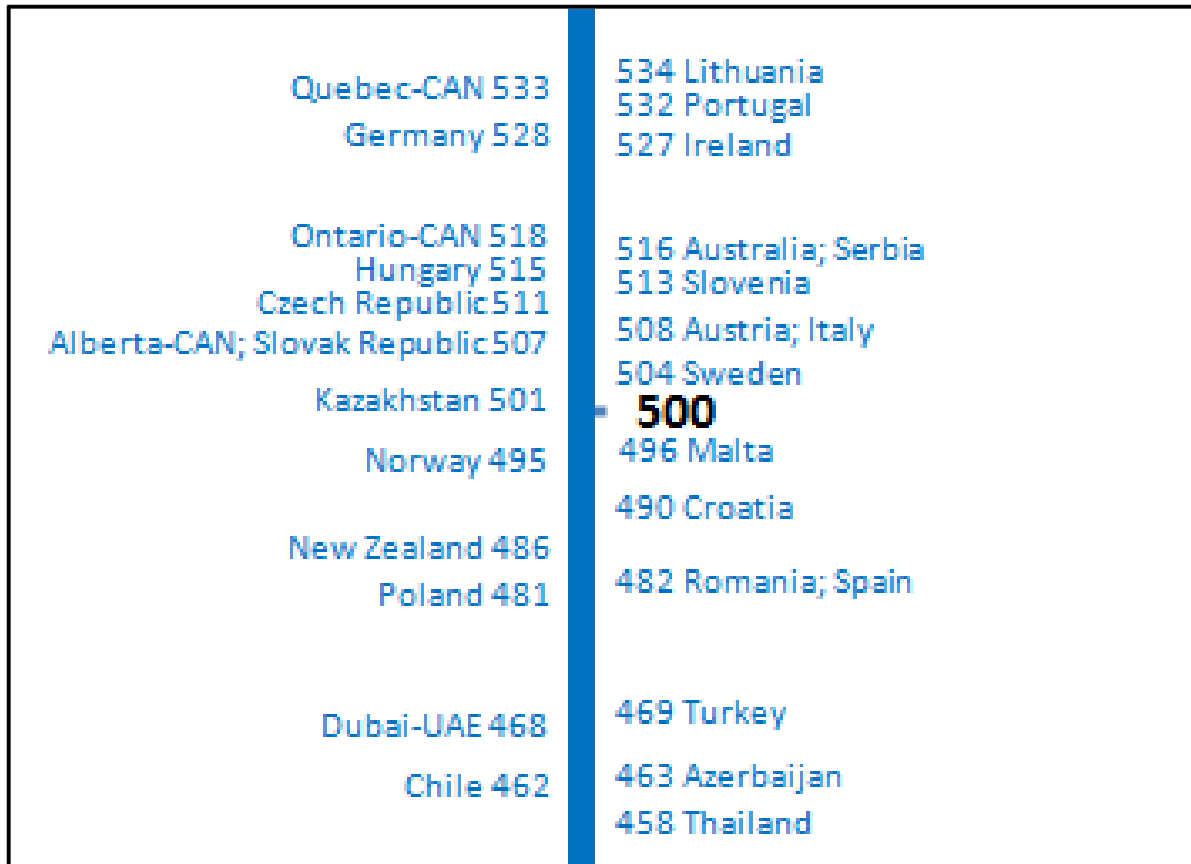
■ Higher than U.S.  
■ Not measurably different than U.S.  
■ Lower than U.S.

# U.S. average (541) not measurably different than in 6 education systems



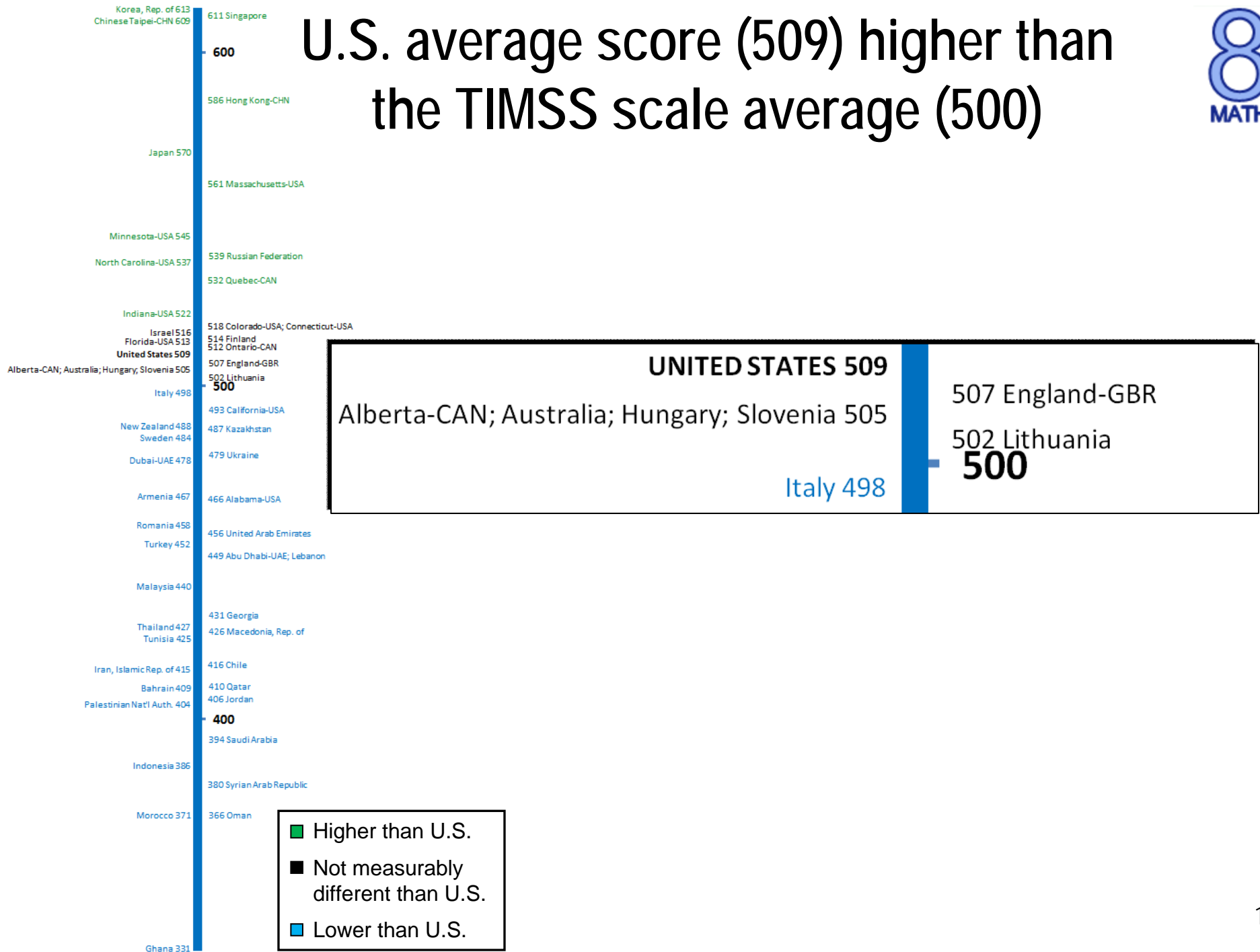


# U.S. average score (541) higher than in 42 education systems

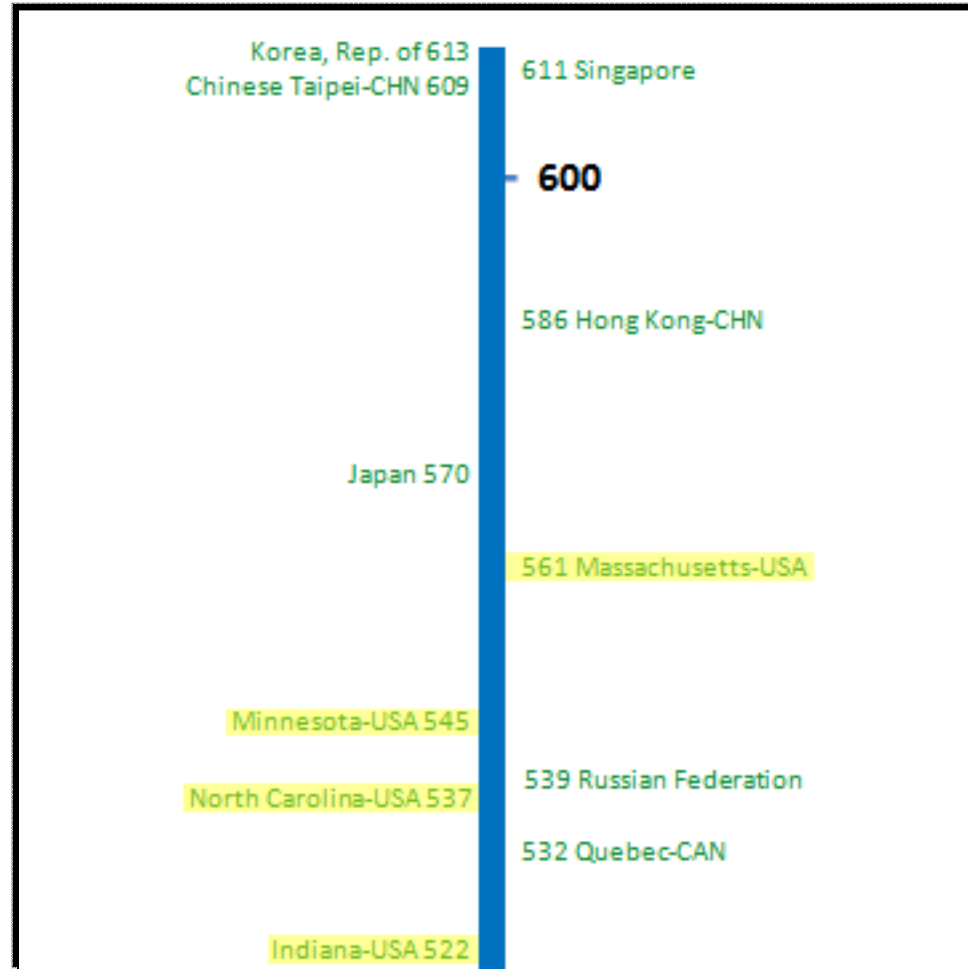


■ Higher than U.S.  
■ Not measurably different than U.S.  
■ Lower than U.S.

# U.S. average score (509) higher than the TIMSS scale average (500)

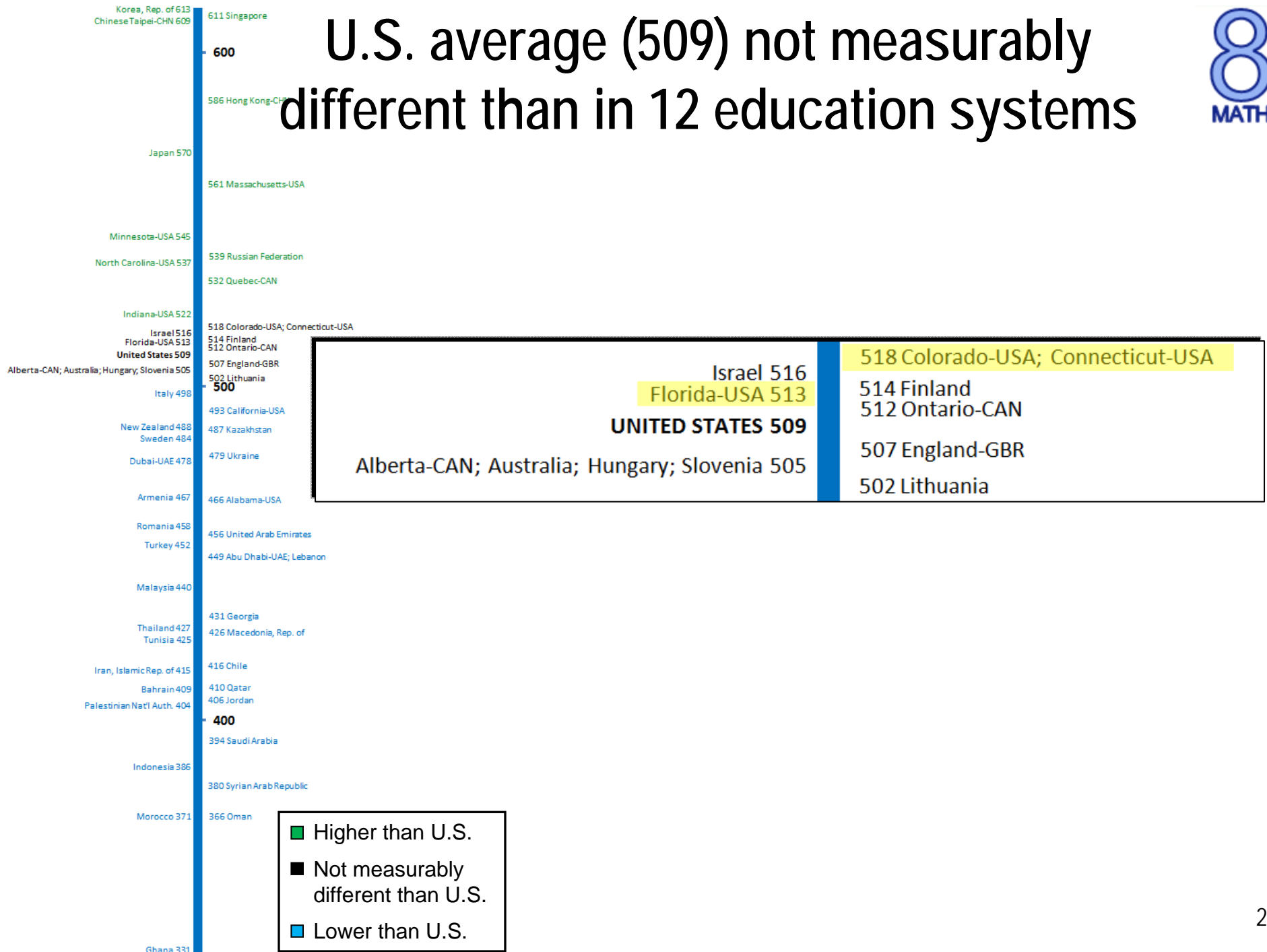


# U.S. average score (509) lower than in 11 education systems

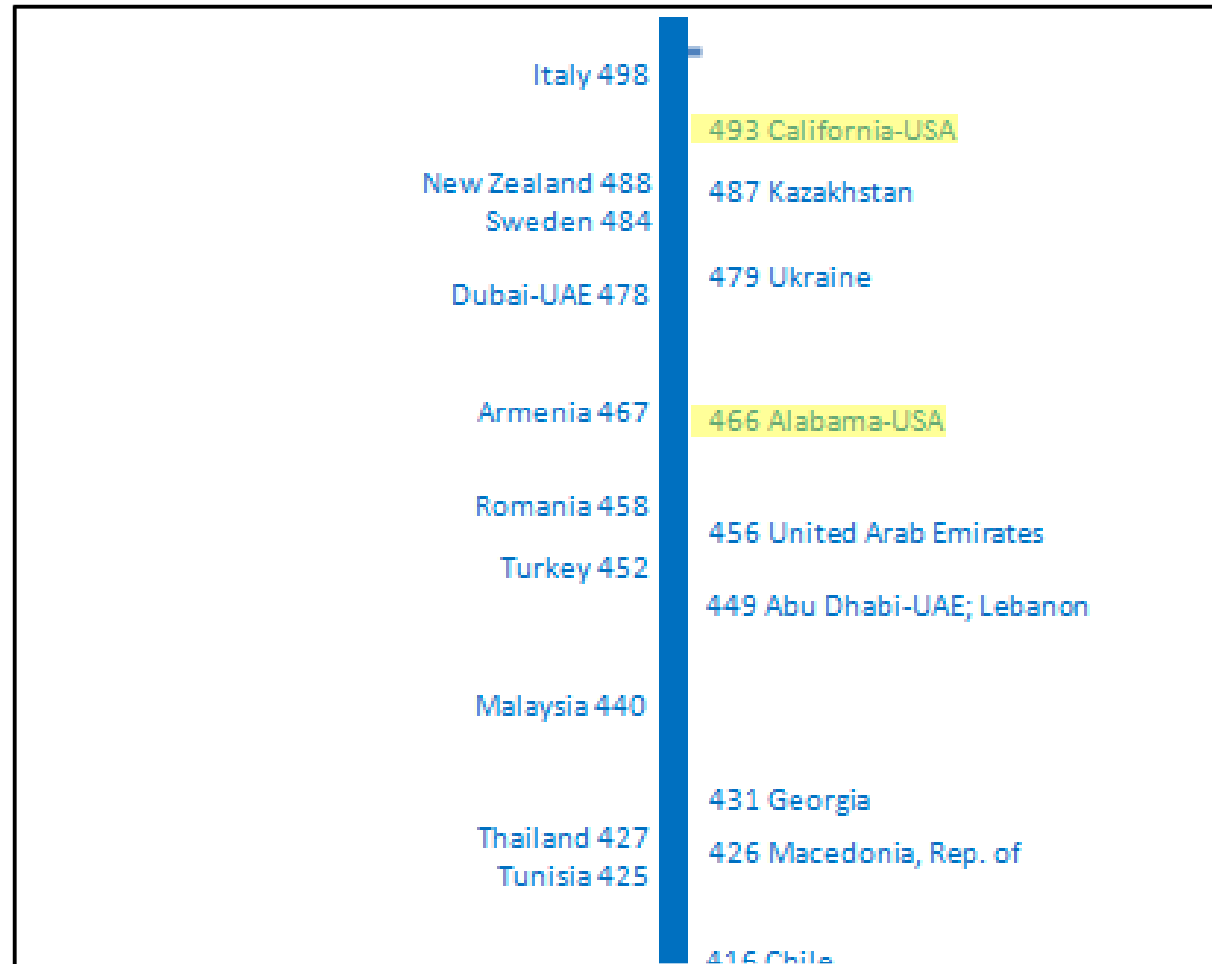


- Higher than U.S.
- Not measurably different than U.S.
- Lower than U.S.

# U.S. average (509) not measurably different than in 12 education systems



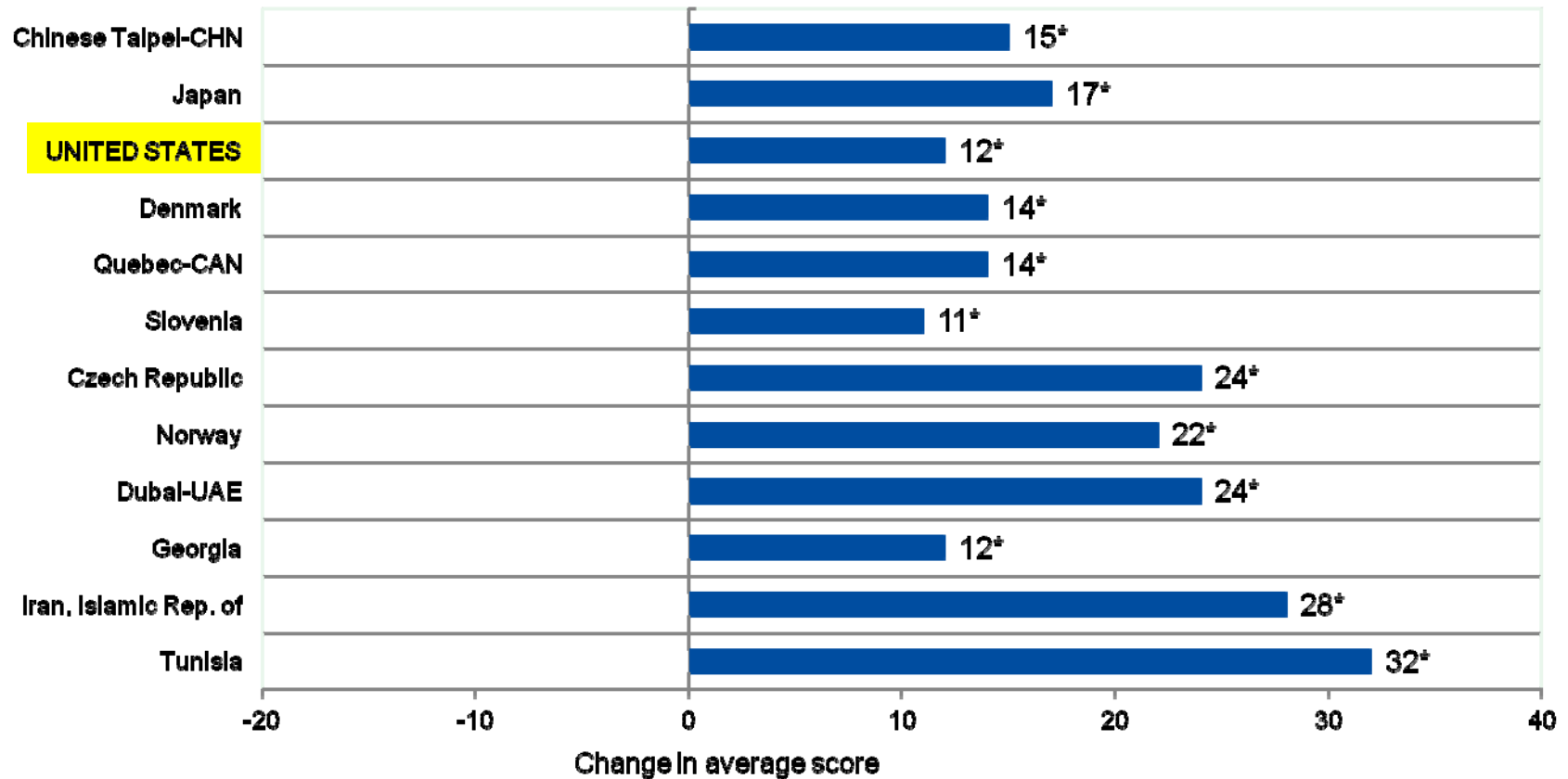
# U.S. average score (509) higher than in 32 education systems



■ Higher than U.S.  
■ Not measurably different than U.S.  
■ Lower than U.S.

# 4 MATH

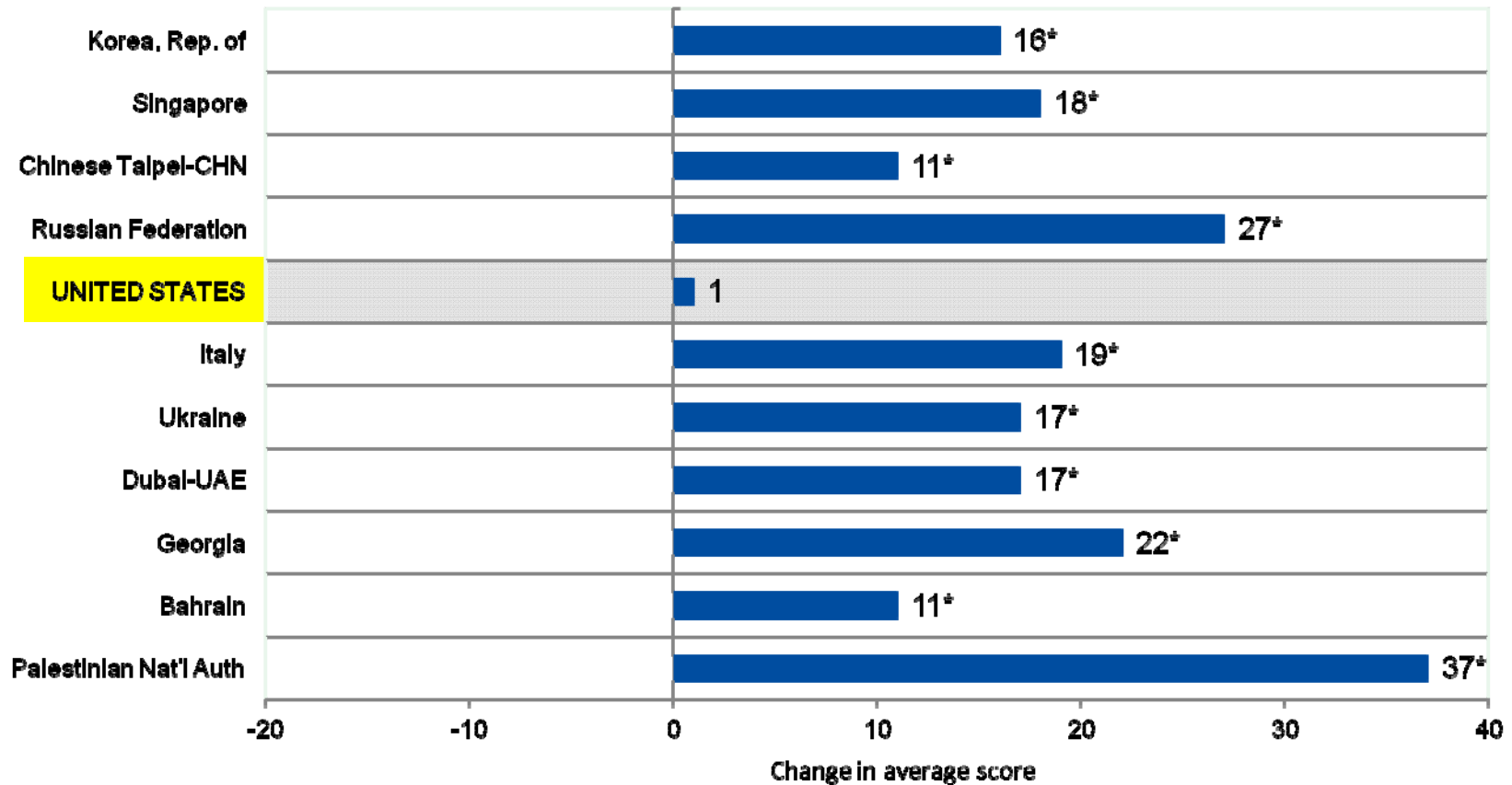
## Average mathematics scores of 4th-grade students **increased** from 2007 to 2011 in 12 education systems, including the U.S.



\* $p < .05$ . Change in average scores is significant.

NOTE: Education systems ordered according to average mathematics score in 2011.

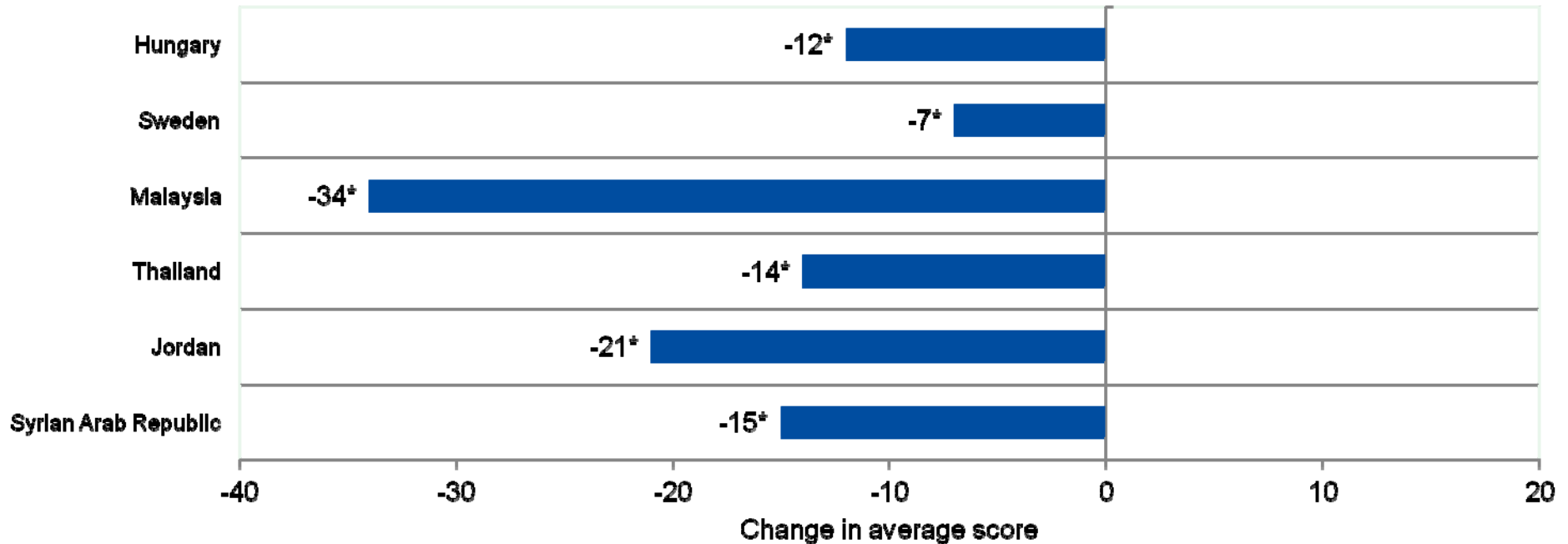
# Average mathematics scores of 8th-grade students **increased** from 2007 to 2011 in 10 education systems



\* $p < .05$ . Change in average scores is significant.

NOTE: Education systems ordered according to average mathematics score in 2011.

# Average mathematics scores of 8th-grade students **decreased** from 2007 to 2011 in 6 education systems



\* $p < .05$ . Change in average scores is significant.

NOTE: Education systems ordered according to average mathematics score in 2011.



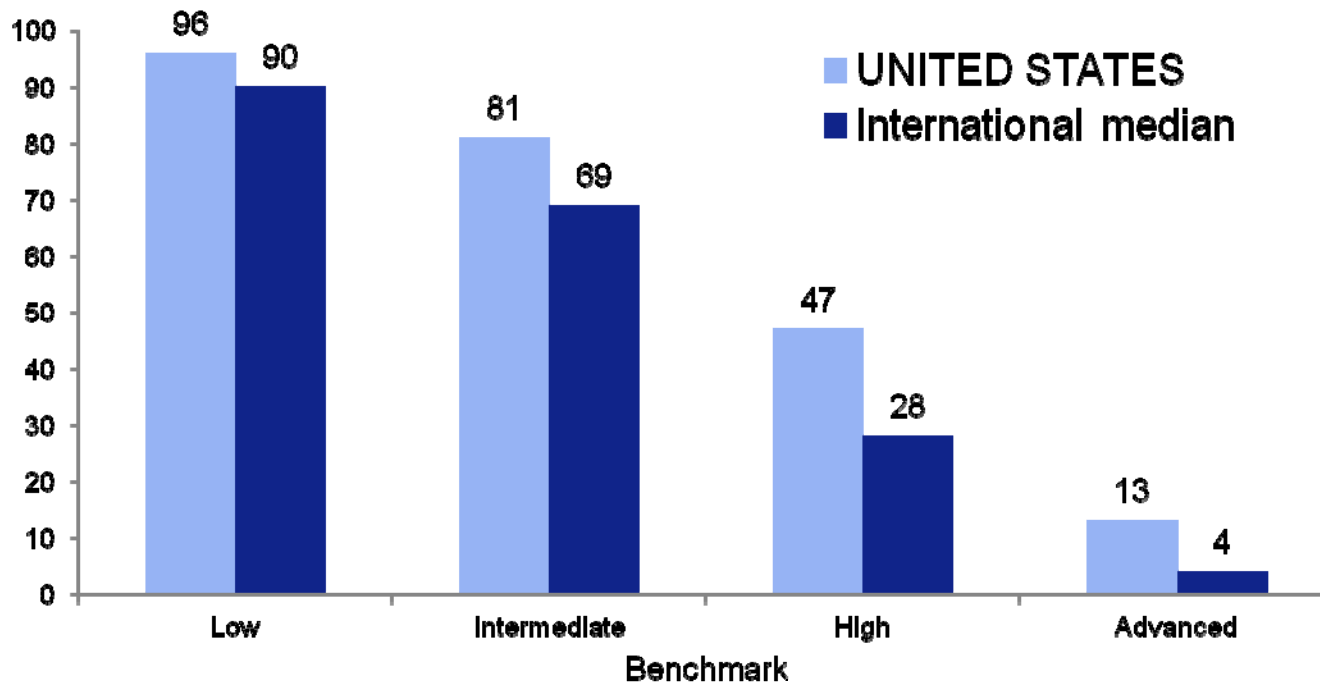
# TIMSS international mathematics benchmarks

	Grade 4	Grade 8
Advanced (625)	Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.	Students can reason with information, draw conclusions, make generalizations, and solve linear equations.
High (550)	Students can apply their knowledge and understanding to solve problems.	Students can apply their understanding and knowledge in a variety of relatively complex situations.
Intermediate (475)	Students can apply basic mathematical knowledge in straightforward situations.	Students can apply basic mathematical knowledge in straightforward situations.
Low (400)	Students have some basic mathematical knowledge.	Students have some knowledge of whole numbers and decimals, operations, and basic graphs.



# Percentages of U.S. 4th-graders reaching TIMSS mathematics benchmarks were higher than international medians in 2011

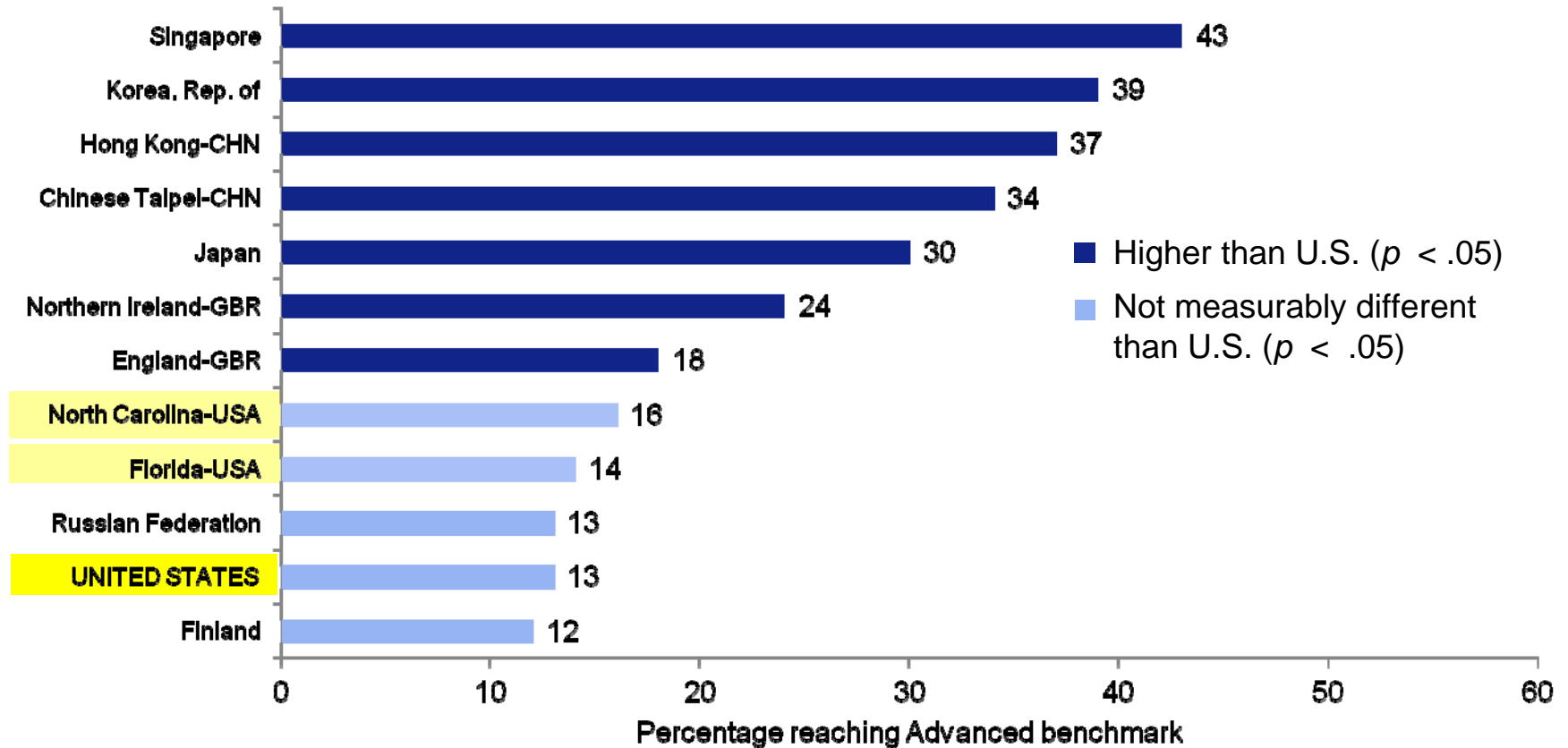
Percent at or above



NOTE: All U.S. percentages are significantly higher than the corresponding TIMSS international median at the .05 level of statistical significance.

# 4 MATH

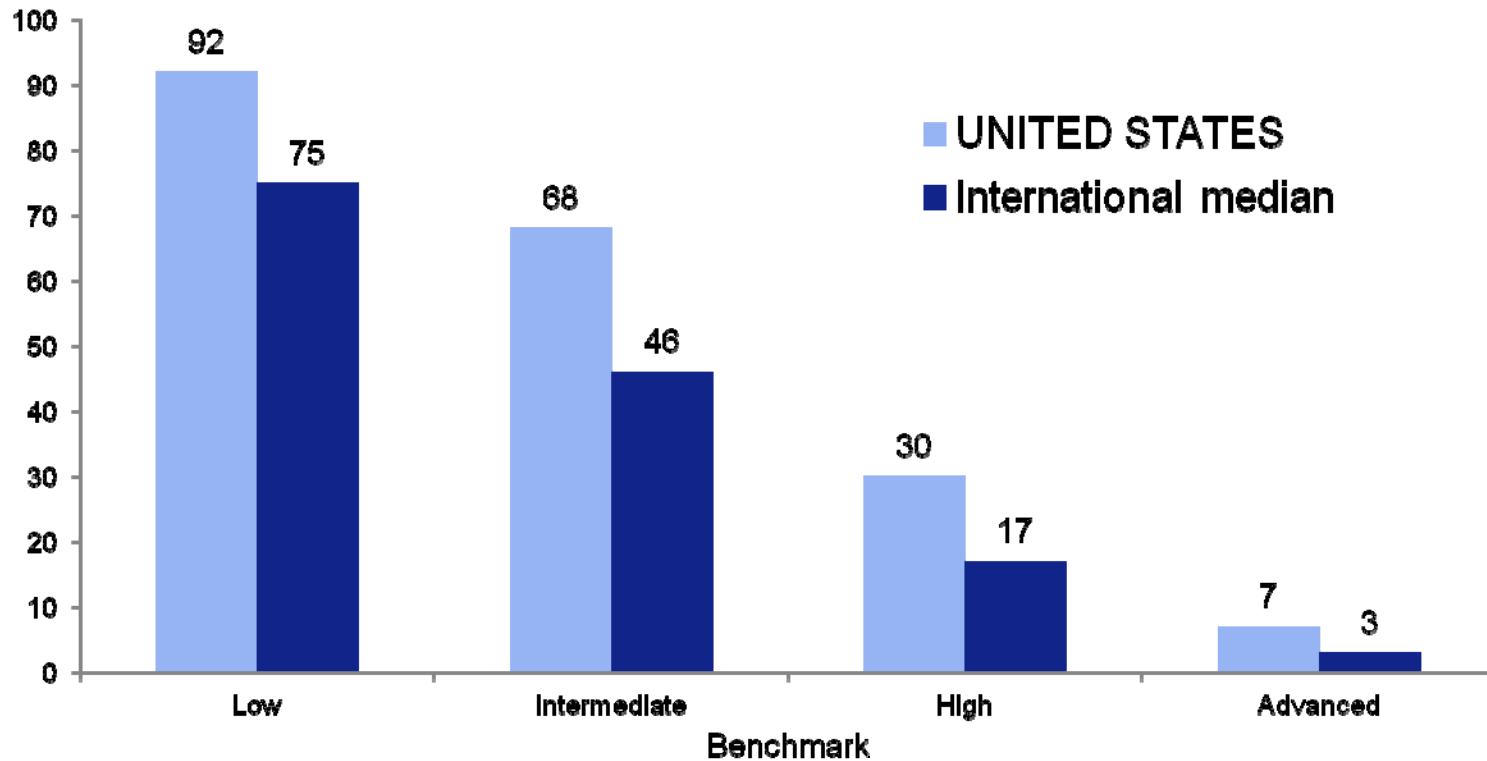
## Seven systems had higher percentages of 4th-grade students reaching *Advanced* than the U.S.



NOTE: Education systems with lower percentages of students reaching the *Advanced* benchmark than the percentage of U.S. students reaching the *Advanced* benchmark are not included in figure.

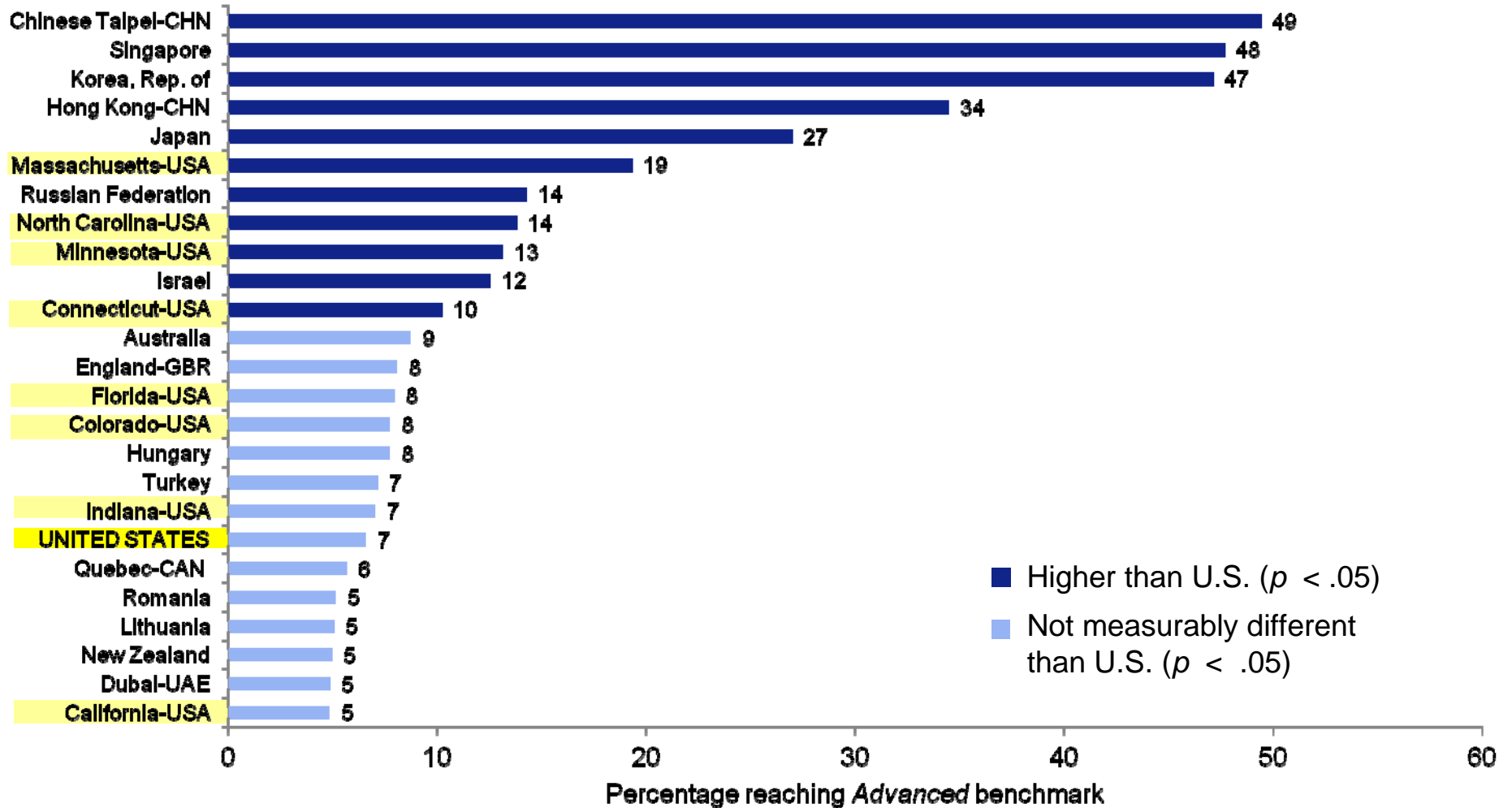
# Percentages of U.S. 8th-graders reaching TIMSS mathematics benchmarks were higher than international medians in 2011

Percent at or above



NOTE: All U.S. percentages are significantly higher than the corresponding TIMSS international median at the .05 level of statistical significance.

# Eleven systems had higher percentages of 8th-graders reaching *Advanced* than the U.S.

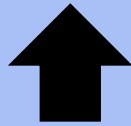


NOTE: Education systems with lower percentages of students reaching the *Advanced* benchmark than the percentage of U.S. students reaching the *Advanced* benchmark are not included in figure.

# Summary of change in average U.S. scores over time

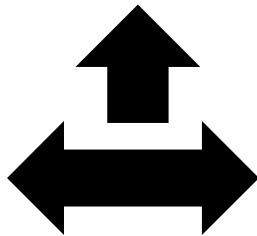
Grade 4

**TIMSS  
Mathematics  
2007-2011**



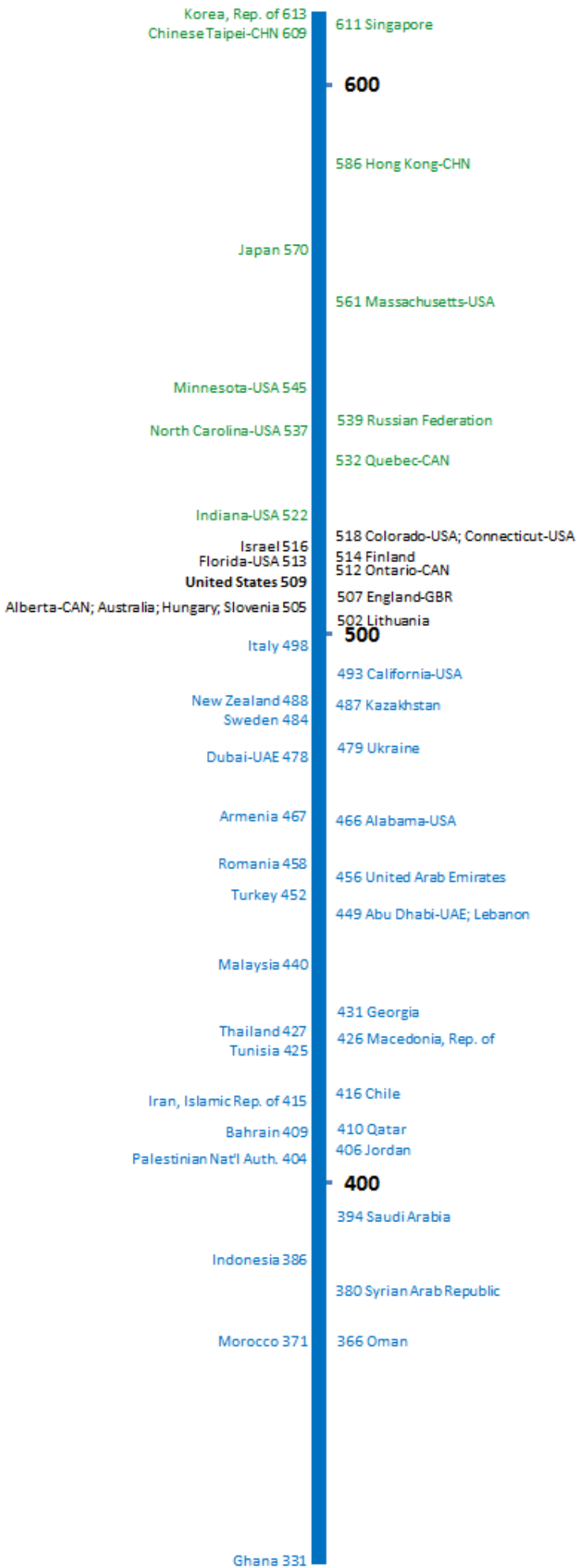
Grade 8

**TIMSS  
Mathematics  
2007-2011**

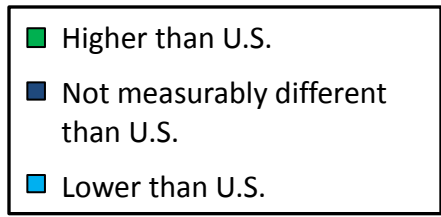
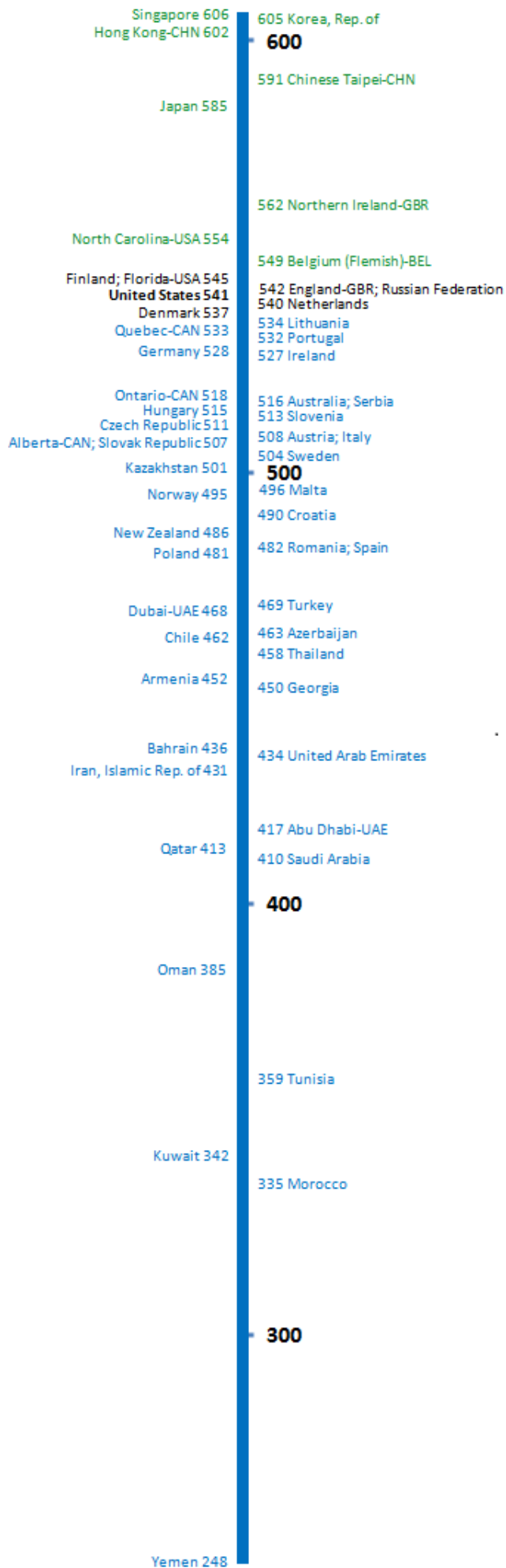


Change over time in U.S. average scores was statistically significant.

Change over time in U.S. average scores was not measurably different.



- Higher than U.S.
- Not measurably different than U.S.
- Lower than U.S.





# For more information

## TIMSS

TIMSS at NCES:

<http://nces.ed.gov/timss/>

International Data Explorer:

<http://nces.ed.gov/timss/idetimss/>

Contact:

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