TIMSS
Advanced
2015

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

Teacher Questionnaire
Advanced Mathematics

National Center for Education Statistics
U.S. Department of Education
1990 K St. NW
Washington, DC 20006-5650

TIMSS & PIRLS
International Study Center
Lynch School of Education, Boston College

Teacher *Questionnaire—Advanced Mathematics*

Your school has agreed to participate in TIMSS Advanced 2015 (Trends in International Mathematics and Science Study), an educational research project sponsored by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS Advanced measures trends in student achievement in advanced mathematics and physics and studies differences in national education systems in order to help improve teaching and learning worldwide.

This questionnaire is addressed to teachers of twelfth-grade students who have taken or are taking a calculus course. It seeks information about teachers' academic and professional backgrounds, classroom resources, instructional practices, and attitudes toward teaching. Since your class has been selected as part of a nationwide sample, your responses are very important in helping to describe the school system in the United States.

Some of the questions in the questionnaire refer to the "**TIMSS class**" or "**this class**." This is the class that is identified on the front of this booklet and that will be tested as part of TIMSS Advanced in your school. It is important that you answer each question carefully so that the information that you provide reflects your situation as accurately as possible.

Since TIMSS Advanced is an international study and all countries are using the same questionnaire, you may find that some of the questions seem unusual or are not entirely relevant to you or schools in the United States. Nevertheless, it is important that you do your best to answer all of the questions so comparisons can be made across countries in the studies.

It is estimated that you will need approximately 30 minutes to complete this questionnaire. We appreciate the time and effort that this takes and thank you for your cooperation and contribution.

When you have completed the questionnaire, please place it in the accompanying envelope and return it to the TIMSS school coordinator.

NCES is authorized to collect information from the questionnaire under the Education Science Reform Act of 2002 (ESRA 2002), 20 U.S. Code, § 9543. You do not have to provide the information requested. However, the information you provide will help the U.S. Department of Education's ongoing efforts to understand better how the educational system in the United States compares to that in other countries. There are no penalties should you choose not to participate in this study. Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 U.S. Code, § 9573). Your response will be combined with those from other participants to produce summary statistics and reports.

This survey is estimated to take an average of 30 minutes, including time for reviewing instructions, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing burden, to: Stephen Provasnik, National Center for Education Statistics, U.S. Department of Education, 1990 K Street NW, Room 8123, Washington, DC 20006-5650. Do not return the completed form to this address.

Thank you.

TIMSS ADVANCED 2015

About You

1

A. What year did you start teaching?

_____

Please write in a year.

B. At the end of this school year, how many years will you have taught altogether?

_____ years

*Please **round** to the nearest whole number.*

2

Are you female or male?

*Fill in **one** circle only.*

Female --- ①

Male --- ②

3

How old are you?

*Fill in **one** circle only.*

Under 25 --- ①

25–29 --- ②

30–39 --- ③

40–49 --- ④

50–59 --- ⑤

60 or more --- ⑥

4

What is the <u>highest</u> level of formal education you have completed?

*Fill in **one** circle only.*

Did not complete a college degree --- ① ⟶

(If you have not completed a college degree, go to question 6)

Associate's degree
(2-year college program) --- ②

Bachelor's degree
(4-year college program) --- ③

Master's degree or professional degree
(MD, DDS, lawyer, minister) --- ④

Doctorate (Ph.D., or Ed.D.) --- ⑤

5

During your college or university education, what was your <u>major or main</u> area(s) of study?

*Fill in only **one** circle for each row.*

	Yes	No
a) Mathematics	①	②
b) Physics	①	②
c) Biology	①	②
d) Chemistry	①	②
e) Earth Science	①	②
f) Engineering	①	②
g) Education– Mathematics	①	②
h) Education– Physics	①	②
i) Education– Science	①	②
j) Education– General	①	②
k) Other	①	②

6

How much do you agree with these statements about advanced mathematics and physics education within your school?

*Fill in only **one** circle for each row.*

Agree a lot
Agree a little
Disagree a little
Disagree a lot
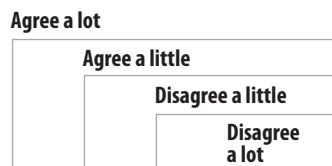
a) The school encourages students to study advanced mathematics and physics -------------------- ① — ② — ③ — ④

b) The school promotes professional development for teachers of advanced mathematics and physics ----- ① — ② — ③ — ④

c) The school provides students with information about career options in advanced mathematics and physics ----- ① — ② — ③ — ④

d) Advanced mathematics and physics teachers are admired by other teachers in the school --- ① — ② — ③ — ④

e) Teachers have high expectations for student achievement in advanced mathematics and physics ------------------------ ① — ② — ③ — ④

f) Students at this school respect students who excel in advanced mathematics and physics ----- ① — ② — ③ — ④

g) Parents expect their children to study advanced mathematics and physics -------------------- ① — ② — ③ — ④

7

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

*Fill in only **one** circle for each row.*

Agree a lot
Agree a little
Disagree a little
Disagree a lot
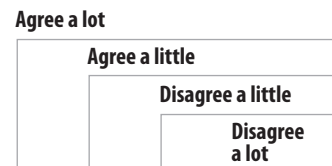
a) This school is located in a safe neighborhood ---------- ① — ② — ③ — ④

b) I feel safe at this school -------- ① — ② — ③ — ④

c) This school's security policies and practices are sufficient ---- ① — ② — ③ — ④

d) The students behave in an orderly manner ---------------- ① — ② — ③ — ④

e) The students are respectful of the teachers ---------------- ① — ② — ③ — ④

f) The students respect school property ---------------- ① — ② — ③ — ④

g) This school has clear rules about student conduct -------- ① — ② — ③ — ④

h) This school's rules are enforced in a fair and consistent manner ------------- ① — ② — ③ — ④

8

In your current school, how severe is each problem?

*Fill in only **one** circle for each row.*

Not a problem
Minor problem
Moderate problem
Serious problem

a) The school building needs significant repair ------------- ① — ② — ③ — ④

b) Teachers do not have adequate workspace (e.g., for preparation, collaboration, or meeting with students) ---- ① — ② — ③ — ④

c) Teachers do not have adequate instructional materials and supplies -------- ① — ② — ③ — ④

d) The school classrooms are not cleaned often enough --------- ① — ② — ③ — ④

e) The school classrooms need maintenance work ------------- ① — ② — ③ — ④

f) Teachers do not have adequate technological resources -------- ① — ② — ③ — ④

g) Teachers do not have adequate support for using technology --------------------- ① — ② — ③ — ④

9

How often do you have the following types of interactions with other teachers?

*Fill in only **one** circle for each row.*

Very often
Often
Sometimes
Never or almost never

a) Discuss how to teach a particular topic ------------- ① — ② — ③ — ④

b) Collaborate in planning and preparing instructional materials ----------------------- ① — ② — ③ — ④

c) Share what I have learned about my teaching experiences ---------- ① — ② — ③ — ④

d) Visit another classroom to learn more about teaching ---- ① — ② — ③ — ④

e) Work together to try out new ideas ------------- ① — ② — ③ — ④

f) Work as a group on implementing the curriculum --------------------- ① — ② — ③ — ④

g) Work with teachers from other grades to ensure continuity in learning --------- ① — ② — ③ — ④

10

How often do you feel the following way about being a teacher?

*Fill in only **one** circle for each row.*

Very often
 Often
  Sometimes
   Never or almost never

a) I am content with my profession as a teacher -------- ① — ② — ③ — ④

b) I am satisfied with being a teacher at this school -------- ① — ② — ③ — ④

c) I find my work full of meaning and purpose --------- ① — ② — ③ — ④

d) I am enthusiastic about my job ----------------- ① — ② — ③ — ④

e) My work inspires me ----------- ① — ② — ③ — ④

f) I am proud of the work I do --- ① — ② — ③ — ④

g) I am going to continue teaching for as long as I can --- ① — ② — ③ — ④

11

Indicate the extent to which you agree or disagree with each of the following statements.

*Fill in only **one** circle for each row.*

Agree a lot
 Agree a little
  Disagree a little
   Disagree a lot

a) There are too many students in the classes --------- ① — ② — ③ — ④

b) I have too much material to cover in class ------------------ ① — ② — ③ — ④

c) I have too many teaching hours ------------------------- ① — ② — ③ — ④

d) I need more time to prepare for class ----------------------- ① — ② — ③ — ④

e) I need more time to assist individual students ------------ ① — ② — ③ — ④

f) I feel too much pressure from parents ------------------ ① — ② — ③ — ④

g) I have difficulty keeping up with all of the changes to the curriculum -------------------- ① — ② — ③ — ④

h) I have too many administrative tasks -------------------------- ① — ② — ③ — ④

Teacher *Questionnaire — Advanced Mathematics*

If you teach more than one advanced mathematics or physics class, select <u>one</u> of your classes and keep it in mind as you answer questions 12 through 15.

12

How many students are in this class?

_____ students
Write in the number.

13

How many students in this class experience difficulties understanding <u>spoken</u> English?

_____ students in this class
Write in the number.

14

How often do you do the following in teaching this class?

*Fill in only **one** circle for each row.*

	Every or almost every lesson	About half the lessons	Some lessons	Never
a) Relate the lesson to students' daily lives	1	2	3	4
b) Ask students to explain their answers	1	2	3	4
c) Ask students to complete challenging exercises that require them to go beyond the instruction	1	2	3	4
d) Encourage classroom discussions among students	1	2	3	4
e) Link new content to students' prior knowledge	1	2	3	4
f) Ask students to decide their own problem solving procedures	1	2	3	4
g) Encourage students to express their ideas in class	1	2	3	4

15

In your view, to what extent do the following limit how you teach this class?

*Fill in only **one** circle for each row.*

	Not at all	Some	A lot
a) Students lacking prerequisite mathematics knowledge or skills	1	2	3
b) Students suffering from lack of basic nutrition	1	2	3
c) Students suffering from not enough sleep	1	2	3
d) Students with physical disabilities	1	2	3
e) Students with mental, emotional, or psychological disabilities	1	2	3

If you teach more than one advanced mathematics class, select <u>one</u> of your classes and keep it in mind as you answer questions 16 through 19.

16

In a typical week, how much time do you spend teaching advanced mathematics to the students in this class?

_____ minutes per week
Write in the number of minutes per week.
Please convert the number of instructional hours or periods into minutes.

17

How many minutes per week do you usually spend preparing to teach this class?

_____ minutes per week
Write in the number of minutes per week.
Please convert the number of hours into minutes.

18

In teaching advanced mathematics to this class, how would you characterize your confidence in doing the following?

*Fill in only **one** circle for each row.*

	Very high	High	Medium	Low
a) Inspiring students to learn advanced mathematics	①	②	③	④
b) Showing students a variety of problem solving strategies	①	②	③	④
c) Providing challenging tasks for the highest achieving students	①	②	③	④
d) Adapting my teaching to engage students' interest	①	②	③	④
e) Helping students appreciate the value of learning advanced mathematics	①	②	③	④
f) Assessing student comprehension of advanced mathematics	①	②	③	④
g) Improving the understanding of struggling students	①	②	③	④
h) Making advanced mathematics relevant to students	①	②	③	④
i) Developing students' higher-order thinking skills	①	②	③	④

19

In teaching advanced mathematics to this class, how often do you ask students to do the following?

*Fill in only **one** circle for each row.*

Every or almost every lesson
About half the lessons
Some lessons
Never

a) Listen to me explain new mathematics content ---- ① — ② — ③ — ④

b) Listen to me explain how to solve problems --------------- ① — ② — ③ — ④

c) Memorize rules, formulas, procedures, and facts ---------- ① — ② — ③ — ④

d) Work problems (individually or with peers) with my guidance ---------------------- ① — ② — ③ — ④

e) Work problems together in the whole class with direct guidance from me ------------ ① — ② — ③ — ④

f) Work problems (individually or with peers) while I am occupied by other tasks ------- ① — ② — ③ — ④

g) Solve problems like the examples in their textbooks -- ① — ② — ③ — ④

h) Discuss problem solving strategies --------------------- ① — ② — ③ — ④

i) Work on problems for which there is no immediately obvious method of solution --- ① — ② — ③ — ④

j) Communicate their arguments -------------------- ① — ② — ③ — ④

k) Take a written test or quiz ----- ① — ② — ③ — ④

Question 20 asks about technology for teaching mathematics to the students in the TIMSS class. If you teach more than one advanced mathematics class, select <u>one</u> of your classes and keep it in mind as you answer question 20.

20

A. Do the students in this class have computers, tablets, calculators, or smartphones available to use during their advanced mathematics lessons?

*Fill in **one** circle only.*

Yes -- ①

No -- ② ⟶

(If No, go to question 21)

If Yes,

B. How often do you have the students do the following activities on computers, tablets, calculators, or smartphones during advanced mathematics lessons?

*Fill in only **one** circle for each row.*

Every or almost every day
Once or twice a week
Once or twice a month
Never or almost never

a) Read the textbook or course materials in digital format ----------------- ① — ② — ③ — ④

b) Look up ideas and information ------------------- ① — ② — ③ — ④

c) Process and analyze data ------ ① — ② — ③ — ④

d) Draw graphs of functions ------ ① — ② — ③ — ④

e) Solve equations --------------- ① — ② — ③ — ④

f) Manipulate algebraic expressions ------------------- ① — ② — ③ — ④

g) Conduct modeling and simulations ------------------- ① — ② — ③ — ④

h) Perform numerical integration -------------------- ① — ② — ③ — ④

Advanced Mathematics Topics Taught to the TIMSS Class

Question 21 asks about the topics taught and the content covered in teaching advanced mathematics to the students in the TIMSS class. If you teach more than one advanced mathematics class, select <u>one</u> of your classes and keep it in mind as you answer question 21.

21

The following list includes the main topics addressed by the TIMSS Advanced mathematics test. Choose the response that best describes when the students in this class have been taught each topic. If a topic was in the curriculum before this year, please choose "Mostly taught before this year." If a topic was taught half this year but not yet completed, please choose "Mostly taught this year." If a topic is not in the curriculum, please choose "Not yet taught or just introduced."

*Fill in only **one** circle for each row.*

	Mostly taught before this year	Mostly taught this year	Not yet taught or just introduced
A. Algebra			
a) Operations with exponential, logarithmic, polynomial, rational, and radical expressions	①	②	③
b) Operations with complex numbers	①	②	③
c) Evaluating algebraic expressions (e.g., exponential, logarithmic, polynomial, rational, and radical)	①	②	③
d) The nth term of arithmetic and geometric sequences and the sums of finite and infinite series	①	②	③
e) Linear, simultaneous, and quadratic equations and inequalities; radical equations, logarithmic, and exponential equations	①	②	③
f) Slopes, y-axis intercepts, and points of intersection of straight lines	①	②	③
g) Equivalent representations of functions, including composite functions, as ordered pairs, tables, graphs, formulas, or words	①	②	③
h) Properties of functions including domain and range	①	②	③
B. Calculus			
a) Limits of functions	①	②	③
b) Conditions for continuity and differentiability of functions	①	②	③
c) Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, and radical functions); differentiation of products, quotients, and composite functions	①	②	③
d) Using derivatives to solve problems (e.g., in optimization and rates of change)	①	②	③
e) Using first and second derivatives to determine slope and local extrema of functions	①	②	③
f) Using derivatives to determine points of inflection of functions	①	②	③
g) Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals, including calculation of areas	①	②	③
C. Geometry			
a) Properties of geometric figures in two and three dimensions	①	②	③
b) Properties of vectors and their sums and differences	①	②	③
c) Trigonometric properties of triangles (sine, cosine, and tangent)	①	②	③
d) Trigonometric functions and their graphs	①	②	③

Question 22 asks about mathematics homework for the students in the TIMSS class. If you teach more than one advanced mathematics class, select <u>one</u> of your classes and keep it in mind as you answer question 22.

22

A. Do you assign mathematics homework to this class?

*Fill in **one** circle only.*

Yes --- ①

No --- ② ———————▶

(If No, go to question 23)

If Yes,

B. How often do you assign the following kinds of mathematics homework to this class?

*Fill in only **one** circle for each row.*

Always or almost always
 Sometimes
  Never or almost never

a) Doing problem/question sets-- ① — ② — ③

b) Reading the textbook --------- ① — ② — ③

c) Memorizing formulas and procedures ---------------- ① — ② — ③

d) Gathering, analyzing, and reporting data ----------------- ① — ② — ③

e) Finding one or more applications of the content covered ----------------------- ① — ② — ③

f) Working on projects ----------- ① — ② — ③

C. How often do you do the following with the mathematics homework assignments for this class?

*Fill in only **one** circle for each row.*

Always or almost always
 Sometimes
  Never or almost never

a) Correct assignments and give feedback to students ----- ① — ② — ③

b) Have students correct their own homework ---------- ① — ② — ③

c) Discuss the homework in class ------------------------ ① — ② — ③

d) Monitor whether or not the homework was completed ---- ① — ② — ③

e) Use the homework to contribute towards students' grades or marks ----- ① — ② — ③

23

In the past two years, have you participated in professional development in any of the following?

*Fill in only **one** circle for each row.*

	Yes	No
a) Mathematics content	①	②
b) Mathematics pedagogy/instruction	①	②
c) Mathematics curriculum	①	②
d) Integrating information technology into mathematics	①	②
e) Improving students' critical thinking or problem solving skills	①	②
f) Mathematics assessment	①	②
g) Addressing individual students' needs	①	②

24

In the past two years, how many hours in total have you spent in formal in-service/professional development (e.g., workshops, seminars) for mathematics?

*Fill in **one** circle only.*

None --- ①
Less than 6 hours --- ②
6–15 hours --- ③
16–35 hours --- ④
More than 35 hours --- ⑤

25

By the end of this school year, how many years will you have taught mathematics at the advanced level?

_____ years
Number of years taught advanced mathematics

26

A. Are you a member of the National Council of Teachers of Mathematics (NCTM) or the Mathematics Association of America (MAA)?

*Fill in **one** circle only.*

Yes --- ①
No --- ②

B. In the past two years, have you regularly participated in activities sponsored by the National Council of Teachers of Mathematics (NCTM) or the Mathematics Association of America (MAA)?

*Fill in **one** circle only.*

Yes --- ①
No --- ②

27

In the past two years, have you taken part in any of the following activities in mathematics?

*Fill in only **one** circle for each row.*

	Yes	No
a) I attended a workshop or conference	①	②
b) I gave a presentation at a workshop or conference	①	②
c) I took part in an innovative project for curriculum and instruction	①	②

Thank You

Thank you for the thought, time, and effort you have put into completing this questionnaire.

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Teacher Questionnaire Advanced Mathematics

BOSTON
COLLEGE