TIMSS Advanced 2015

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

Teacher Questionnaire Advanced Mathematics

\<TIMSS National Research Center Name\>
\<Address\>

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

IEA

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, and 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 <country>.

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 which 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 <country>. 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 35 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:

<Insert country-specific information here>.

Thank you.

TIMSS ADVANCED 2015

1

By the end of this school year, how many years will you have been teaching altogether?

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

2

Are you female or male?

*Check **one** circle only.*

Female --- ◯

Male --- ◯

3

How old are you?

*Check **one** circle only.*

Under 25 --- ◯

25–29 --- ◯

30–39 --- ◯

40–49 --- ◯

50–59 --- ◯

60 or more --- ◯

4

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

*Check **one** circle only.*

Did not complete <tertiary> education --- ◯ ⟶

(If you have not completed <tertiary> education, go to #6)

<Short-cycle tertiary education—ISCED Level 5> --- ◯

<Bachelor's or equivalent level—ISCED Level 6> --- ◯

<Master's or equivalent level—ISCED Level 7> --- ◯

<Doctor or equivalent level—ISCED Level 8> --- ◯

5

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

*Check **one** circle for each line.*

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

6

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

*Check **one** circle for each line.*

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

a) The school encourages students to study advanced mathematics and physics -------------------- ◯ — ◯ — ◯ — ◯

b) The school promotes professional development for teachers of advanced mathematics and physics ----- ◯ — ◯ — ◯ — ◯

c) The school provides students with information about career options in advanced mathematics and physics ----- ◯ — ◯ — ◯ — ◯

d) Advanced mathematics and physics teachers are admired by other teachers in the school --- ◯ — ◯ — ◯ — ◯

e) Teachers have high expectations for student achievement in advanced mathematics and physics ------------------------ ◯ — ◯ — ◯ — ◯

f) Students at this school respect students who excel in advanced mathematics and physics ----- ◯ — ◯ — ◯ — ◯

g) Parents expect their children to study advanced mathematics and physics ------------------- ◯ — ◯ — ◯ — ◯

7

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

*Check **one** circle for each line.*

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

a) This school is located in a safe neighborhood ---------- ◯ — ◯ — ◯ — ◯

b) I feel safe at this school -------- ◯ — ◯ — ◯ — ◯

c) This school's security policies and practices are sufficient ---- ◯ — ◯ — ◯ — ◯

d) The students behave in an orderly manner ---------------- ◯ — ◯ — ◯ — ◯

e) The students are respectful of the teachers ----------------- ◯ — ◯ — ◯ — ◯

f) The students respect school property ---------------- ◯ — ◯ — ◯ — ◯

g) This school has clear rules about student conduct -------- ◯ — ◯ — ◯ — ◯

h) This school's rules are enforced in a fair and consistent manner ------------- ◯ — ◯ — ◯ — ◯

8

In your current school, how severe is each problem?

*Check **one** circle for each line.*

Not a problem
> Minor problem
>> Moderate problem
>>> Serious problem

a) The school building needs significant repair -------------- ◯ — ◯ — ◯ — ◯

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

c) Teachers do not have adequate instructional materials and supplies -------- ◯ — ◯ — ◯ — ◯

d) The school classrooms are not cleaned often enough --------- ◯ — ◯ — ◯ — ◯

e) The school classrooms need maintenance work ------------- ◯ — ◯ — ◯ — ◯

f) Teachers do not have adequate technological resources -------- ◯ — ◯ — ◯ — ◯

g) Teachers do not have adequate support for using technology --------------------- ◯ — ◯ — ◯ — ◯

9

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

*Check **one** circle for each line.*

Very often
> Often
>> Sometimes
>>> Never or almost never

a) Discuss how to teach a particular topic -------------- ◯ — ◯ — ◯ — ◯

b) Collaborate in planning and preparing instructional materials ----------------------- ◯ — ◯ — ◯ — ◯

c) Share what I have learned about my teaching experiences ---------- ◯ — ◯ — ◯ — ◯

d) Visit another classroom to learn more about teaching ---- ◯ — ◯ — ◯ — ◯

e) Work together to try out new ideas -------------- ◯ — ◯ — ◯ — ◯

f) Work as a group on implementing the curriculum --------------------- ◯ — ◯ — ◯ — ◯

g) Work with teachers from other grades to ensure continuity in learning --------- ◯ — ◯ — ◯ — ◯

10

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

*Check **one** circle for each line.*

Very often
Often
Sometimes
Never or almost never

a) I am content with my profession as a teacher ⟶ ◯ — ◯ — ◯ — ◯

b) I am satisfied with being a teacher at this school ⟶ ◯ — ◯ — ◯ — ◯

c) I find my work full of meaning and purpose ⟶ ◯ — ◯ — ◯ — ◯

d) I am enthusiastic about my job ⟶ ◯ — ◯ — ◯ — ◯

e) My work inspires me ⟶ ◯ — ◯ — ◯ — ◯

f) I am proud of the work I do ⟶ ◯ — ◯ — ◯ — ◯

g) I am going to continue teaching for as long as I can ⟶ ◯ — ◯ — ◯ — ◯

11

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

*Check **one** circle for each line.*

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

a) There are too many students in the classes ⟶ ◯ — ◯ — ◯ — ◯

b) I have too much material to cover in class ⟶ ◯ — ◯ — ◯ — ◯

c) I have too many teaching hours ⟶ ◯ — ◯ — ◯ — ◯

d) I need more time to prepare for class ⟶ ◯ — ◯ — ◯ — ◯

e) I need more time to assist individual students ⟶ ◯ — ◯ — ◯ — ◯

f) I feel too much pressure from parents ⟶ ◯ — ◯ — ◯ — ◯

g) I have difficulty keeping up with all of the changes to the curriculum ⟶ ◯ — ◯ — ◯ — ◯

h) I have too many administrative tasks ⟶ ◯ — ◯ — ◯ — ◯

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> <language of test>?

_____ students in this class
Write in the number.

14

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

*Check **one** circle for each line.*

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

a) Relate the lesson to students' daily lives ---------------------- ◯ — ◯ — ◯ — ◯

b) Ask students to explain their answers ----------------------- ◯ — ◯ — ◯ — ◯

c) Ask students to complete challenging exercises that require them to go beyond the instruction ---------------- ◯ — ◯ — ◯ — ◯

d) Encourage classroom discussions among students -- ◯ — ◯ — ◯ — ◯

e) Link new content to students' prior knowledge ---- ◯ — ◯ — ◯ — ◯

f) Ask students to decide their own problem solving procedures --------------------- ◯ — ◯ — ◯ — ◯

g) Encourage students to express their ideas in class ------------- ◯ — ◯ — ◯ — ◯

15

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

*Check **one** circle for each line.*

Not at all
Some
A lot

a) Students lacking prerequisite mathematics knowledge or skills ------------------------ ◯ — ◯ — ◯

b) Students suffering from lack of basic nutrition --------- ◯ — ◯ — ◯

c) Students suffering from not enough sleep -------------- ◯ — ◯ — ◯

d) Students with physical disabilities --------------------- ◯ — ◯ — ◯

e) Students with mental, emotional, or psychological disabilities --------------------- ◯ — ◯ — ◯

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?

*Check **one** circle for each line.*

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

19

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

*Check **one** circle for each line.*

Every or almost every lesson
About half the lessons
Some lessons
Never
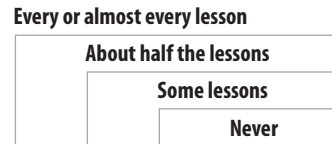
a) Listen to me explain new mathematics content ---- ◯ — ◯ — ◯ — ◯

b) Listen to me explain how to solve problems ---------------- ◯ — ◯ — ◯ — ◯

c) Memorize rules, formulas, procedures, and facts ---------- ◯ — ◯ — ◯ — ◯

d) Work problems (individually or with peers) with my guidance ---------------------- ◯ — ◯ — ◯ — ◯

e) Work problems together in the whole class with direct guidance from me ------------ ◯ — ◯ — ◯ — ◯

f) Work problems (individually or with peers) while I am occupied by other tasks ------- ◯ — ◯ — ◯ — ◯

g) Solve problems like the examples in their textbooks -- ◯ — ◯ — ◯ — ◯

h) Discuss problem solving strategies --------------------- ◯ — ◯ — ◯ — ◯

i) Work on problems for which there is no immediately obvious method of solution --- ◯ — ◯ — ◯ — ◯

j) Communicate their arguments -------------------- ◯ — ◯ — ◯ — ◯

k) Take a written test or quiz ----- ◯ — ◯ — ◯ — ◯

20

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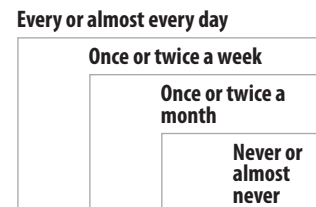
*Check **one** circle only.*

Yes --- ◯

No --- ◯ ⟶

(If No, go to #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?

*Check **one** circle for each line.*

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 ----------------- ◯ — ◯ — ◯ — ◯

b) Look up ideas and information ------------------- ◯ — ◯ — ◯ — ◯

c) Process and analyze data ------ ◯ — ◯ — ◯ — ◯

d) Draw graphs of functions ------ ◯ — ◯ — ◯ — ◯

e) Solve equations ---------------- ◯ — ◯ — ◯ — ◯

f) Manipulate algebraic expressions ------------------- ◯ — ◯ — ◯ — ◯

g) Conduct modeling and simulations ------------------- ◯ — ◯ — ◯ — ◯

h) Perform numerical integration -------------------- ◯ — ◯ — ◯ — ◯

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."

*Check **one** circle for each line.*

	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	○	○	○
b) Operations with complex numbers	○	○	○
c) Evaluating algebraic expressions (e.g., exponential, logarithmic, polynomial, rational, and radical)	○	○	○
d) The nth term of arithmetic and geometric sequences and the sums of finite and infinite series	○	○	○
e) Linear, simultaneous, and quadratic equations and inequalities; radical equations, logarithmic, and exponential equations	○	○	○
f) Slopes, y-axis intercepts, and points of intersection of straight lines	○	○	○
g) Equivalent representations of functions, including composite functions, as ordered pairs, tables, graphs, formulas, or words	○	○	○
h) Properties of functions including domain and range	○	○	○

B. Calculus

a) Limits of functions	○	○	○
b) Conditions for continuity and differentiability of functions	○	○	○
c) Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, and radical functions); differentiation of products, quotients, and composite functions	○	○	○
d) Using derivatives to solve problems (e.g., in optimization and rates of change)	○	○	○
e) Using first and second derivatives to determine slope and local extrema of functions	○	○	○
f) Using derivatives to determine points of inflection of functions	○	○	○
g) Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals, including calculation of areas	○	○	○

C. Geometry

a) Properties of geometric figures in two and three dimensions	○	○	○
b) Properties of vectors and their sums and differences	○	○	○
c) Trigonometric properties of triangles (sine, cosine, and tangent)	○	○	○
d) Trigonometric functions and their graphs	○	○	○

22

A. Do you assign mathematics homework to this class?

*Check **one** circle only.*

Yes --- ◯

No --- ◯ ⟶

(If No, go to #23)

If Yes,

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

*Check **one** circle for each line.*

Always or almost always

　Sometimes

　　Never or almost never

a) Doing problem/question sets-- ◯ — ◯ — ◯

b) Reading the textbook --------- ◯ — ◯ — ◯

c) Memorizing formulas and procedures ---------------- ◯ — ◯ — ◯

d) Gathering, analyzing, and reporting data ----------------- ◯ — ◯ — ◯

e) Finding one or more applications of the content covered -------- ◯ — ◯ — ◯

f) Working on projects ----------- ◯ — ◯ — ◯

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

*Check **one** circle for each line.*

Always or almost always

　Sometimes

　　Never or almost never

a) Correct assignments and give feedback to students ----- ◯ — ◯ — ◯

b) Have students correct their own homework ---------- ◯ — ◯ — ◯

c) Discuss the homework in class ------------------------ ◯ — ◯ — ◯

d) Monitor whether or not the homework was completed ---- ◯ — ◯ — ◯

e) Use the homework to contribute towards students' grades or marks ----- ◯ — ◯ — ◯

Professional Development and Activities

23

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

*Check **one** circle for each line.*

Yes
No

a) Mathematics content ---------------------------- ◯ — ◯

b) Mathematics pedagogy/instruction ------------ ◯ — ◯

c) Mathematics curriculum ----------------------- ◯ — ◯

d) Integrating information technology into mathematics ------------------------------ ◯ — ◯

e) Improving students' critical thinking or problem solving skills --------------------------- ◯ — ◯

f) Mathematics assessment ----------------------- ◯ — ◯

g) Addressing individual students' needs --------- ◯ — ◯

24

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

*Check **one** circle only.*

None --- ◯

Less than 6 hours --- ◯

6–15 hours --- ◯

16–35 hours --- ◯

More than 35 hours --- ◯

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 <professional organization for mathematics teachers>?

*Check **one** circle only.*

Yes --- ◯

No --- ◯

B. In the past two years, have you regularly participated in activities sponsored by <professional organization for mathematics teachers>?

*Check **one** circle only.*

Yes --- ◯

No --- ◯

27

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

*Check **one** circle for each line.*

Yes
No

a) I attended a workshop or conference ----------- ◯ — ◯

b) I gave a presentation at a workshop or conference ----------------------------------- ◯ — ◯

c) I took part in an innovative project for curriculum and instruction ------------------ ◯ — ◯

Thank You

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

TIMSS
Advanced
2015

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

Teacher Questionnaire
Advanced Mathematics

BOSTON
COLLEGE