TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

TIMSS
Advanced   2008

$x \rightarrow \infty$

π

Teacher Questionnaire

Advanced Mathematics

$$1\Big)\big(x^2 - 2x\big) + \big(1 - x^2\big)\big(x^3 +$$

<TIMSS Advanced National Research Center Name>
<Address>

IEA

TIMSS
Advanced
2008

General Directions

Your school has agreed to participate in TIMSS Advanced 2008. Sponsored by the International Association for the Evaluation of Educational Achievement (IEA), TIMSS (for Trends in International Mathematics and Science Study) is measuring trends in student achievement and studying differences in national education systems in order to help improve teaching and learning worldwide.

As part of the study, students in a nationwide sample of <twelfth-grade> classes in <country> will complete the TIMSS Advanced mathematics and/or physics tests. This questionnaire is addressed to the teachers of these students. As a teacher of one of the sampled classes, your responses to these questions are very important in helping to describe education in <country>.

Some of the questions in this questionnaire refer specifically to students in the "TIMSS class". This is the class that is identified on the cover of this questionnaire and will be tested as part of TIMSS Advanced 2008 in your school. It is important that you answer each question carefully so that the information you provide reflects your situation as accurately as possible.

Please identify a time and place where you will be able to complete this questionnaire without being interrupted. This should require no more than 45 minutes. To make it as easy as possible for you to respond, most questions may be answered simply by filling in the appropriate circle.

Once you have completed the questionnaire, place it in the return envelope provided and return it to: <Country Specific Information>

Thank you very much for the time and effort you have put into responding to this questionnaire.

Background Information

1

How old are you?

*Fill in **one** circle only*

Under 25 - ○
25–29 - ○
30–39 - ○
40–49 - ○
50–59 - ○
60 or older - ○

2

Are you female or male?

*Fill in **one** circle only*

Female - ○
Male - ○

3

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

_____

Number of years you have taught

B. How many years will you have taught mathematics at the advanced level?

_____

Number of years taught advanced mathematics

4

How long do you plan to continue teaching advanced mathematics?

*Fill in **one** circle only*

I plan to continue teaching as long as I can - - - - - - ○
I plan to continue teaching until the opportunity
for a better job in education comes along - - - - - - - ○
I plan to continue teaching for awhile
but probably will leave the field of education - - - - - ○
I am undecided at this time - - - - - - - - - - - - - - - - - - ○

Preparation to Teach

5

What is the highest level of formal education you have completed?

*Fill in **one** circle only*

Did not complete <ISCED 3> - - - - - - - - - - - - - - - - - - ○
Finished <ISCED 3> - ○
Finished <ISCED 4> - ○
Finished <ISCED 5B> - ○
Finished <ISCED 5A, first degree> - - - - - - - - - - - - - ○
Finished <ISCED 5A, second degree>
or higher - ○

6

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

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

		Yes	No
a)	Mathematics -	○	○
b)	Education - Mathematics - - - - - - - - - - - -	○	○
c)	Physics -	○	○
d)	Education - Science - - - - - - - - - - - - - - -	○	○
e)	Engineering -	○	○
f)	Education - General - - - - - - - - - - - - - - -	○	○
g)	Other -	○	○

7

Do you have a teaching license or certificate?

	Yes	No
*Fill in **one** circle only* - - - - - - - - - - - - - - - - - - -	○	○

8

How well prepared do you feel you are to teach the following topics?

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

	Very well prepared	Somewhat prepared	Not well prepared

A. Algebra

a) Operations with complex numbers — ○ -- ○ -- ○

b) The nth term of numeric and algebraic series and the sums to n terms or infinity of series — ○ -- ○ -- ○

c) Problems involving permutations, combinations, and probability — ○ -- ○ -- ○

d) Linear, simultaneous, and quadratic equations and inequalities; surd (radical) equations, logarithmic, and exponential equations — ○ -- ○ -- ○

e) Equivalent representations of functions as ordered pairs, tables, graphs, formulas, or words — ○ -- ○ -- ○

f) Values of functions, including rational functions for given values and ranges of the variables; function of a function — ○ -- ○ -- ○

B. Calculus

a) Limits of functions including rational functions; conditions for continuity and differentiability of functions — ○ -- ○ -- ○

b) Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, radical, composite, and parametric functions); differentiation of products and quotients — ○ -- ○ -- ○

c) Using derivatives to solve problems (e.g., in kinematics, optimization, and rates of change) — ○ -- ○ -- ○

d) Using first and second derivatives to determine gradient, turning points, and points of inflection of functions — ○ -- ○ -- ○

e) Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals — ○ -- ○ -- ○

C. Geometry

a) Properties of geometric figures; proving geometric propositions in two and three dimensions — ○ -- ○ -- ○

b) Gradients, y-axis intercepts, and points of intersection of straight lines in the Cartesian plane — ○ -- ○ -- ○

c) Equations and properties of circles in the Cartesian plane; tangents and normals to given points on a circle — ○ -- ○ -- ○

d) Trigonometric properties of triangles (sine, cosine, and tangent); solving equations involving trigonometric functions — ○ -- ○ -- ○

e) Properties of vectors and their sums and differences — ○ -- ○ -- ○

Professional Development

9

In your school, how often do you have the following types of interactions with other teachers?

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

	Never or almost never	2 or 3 times per month	1-3 times per week	Daily or almost daily
a) Discussions about how to teach a particular concept	○	○	○	○
b) Working on preparing instructional materials	○	○	○	○
c) Visits to another teacher's classroom to observe his/her teaching	○	○	○	○
d) Informal observations of **my** classroom by another teacher	○	○	○	○

10

A. Are you a member of <professional organization for mathematics teachers>?

	Yes	No
*Fill in **one** circle only*	○	○

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

	Yes	No
*Fill in **one** circle only*	○	○

11

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

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

	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	○	○

12

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

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

	Yes	No
a) I attended a workshop or conference	○	○
b) I gave a presentation at a workshop or conference	○	○
c) I published an article in a journal or magazine for teachers (print or online)	○	○
d) I took part in an innovative project for curriculum and instruction	○	○
e) I exchanged information online about how to teach mathematics (e.g., email, forums, website)	○	○

Your School

13

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.
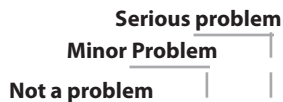
*Fill in **one** circle for each row*
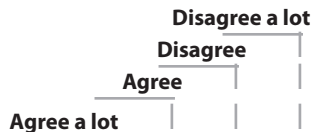
	Agree a lot	Agree	Disagree	Disagree a lot
a) This school is located in a safe neighborhood	○	○	○	○
b) I feel safe at this school	○	○	○	○
c) This school's security policies and practices are sufficient	○	○	○	○

14

In your current school, how severe is each problem?

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

	Not a problem	Minor Problem	Serious problem
a) The school building needs significant repair	○	○	○
b) Classrooms are overcrowded	○	○	○
c) Teachers do not have adequate workspace outside their classroom	○	○	○

15

How would you characterize each of the following within your school?

*Fill in **one** circle for each row*
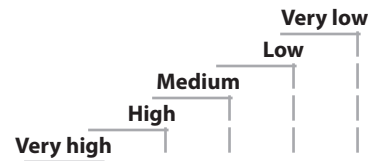
	Very high	High	Medium	Low	Very low
a) Teachers' job satisfaction	○	○	○	○	○
b) Teachers' understanding of the school's curricular goals	○	○	○	○	○
c) Teachers' degree of success in implementing the school's curriculum	○	○	○	○	○
d) Teachers' expectations for student achievement	○	○	○	○	○
e) Support for teachers' professional development	○	○	○	○	○
f) Parental support for student achievement	○	○	○	○	○
g) Parental involvement in school activities	○	○	○	○	○
h) Students' regard for school property	○	○	○	○	○
i) Students' desire to do well in school	○	○	○	○	○

The TIMSS Class

The remaining questions refer to the <TIMSS class>. Remember, the "TIMSS class" refers to students you are teaching in the mathematics group, which is identified on the cover of this questionnaire and will be tested as part of TIMSS Advanced 2008 in your school.

16

How many students are in the <TIMSS class>?

_____

Write in the number of students

17

How many minutes per week do you teach mathematics to the <TIMSS class>?

_____

*Write in the number of **minutes** per week*

Please convert the number of instructional hours or periods into minutes.

18

How many minutes per week do you usually spend preparing to teach the <TIMSS class>?

_____

*Write in the number of **minutes** per week*

Please convert the number of hours into minutes.

19

A. Do you use a textbook as the basis for instruction in teaching mathematics to the <TIMSS class>?

No

Yes

*Fill in **one** circle only* - ◯ - - - ◯

B. Does each student have his or her own textbook?

No

Yes

*Fill in **one** circle only* - ◯ - - - ◯

C. How often do you require students to do the following?

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

Never

Some lessons

About half the lessons

Every or almost every lesson

a) Do problems or exercises from their textbooks - - - - - - ◯ - - ◯ - - ◯ - - - ◯

b) Read the textbook examples of how to do problems or exercises - - - - - ◯ - - ◯ - - ◯ - - - ◯

c) Read about mathematical theory from their textbooks ◯ - - ◯ - - ◯ - - - ◯

Teaching Mathematics to the TIMSS Class

20

In a typical week of mathematics lessons for the <TIMSS class>, what percentage of time is spent on each of the following activities?

Write in the percent
The total should add to 100%

a) Teaching new material to the whole class --------------------------------- _____%

b) Students working problems on their own or with other students ----------- _____%

c) Reviewing and summarizing what has been taught for the whole class ------------ _____%

d) Reviewing homework ------------------------ _____%

e) Re-teaching and clarifying content/procedures for the whole class -------------------------------------- _____%

f) Oral or written tests or quizzes -------------- _____%

g) Classroom management tasks not related to the lesson's content/purpose (e.g., interruptions and keeping order) ----------------------------- _____%

h) Other activities -------------------------------- _____%

Total -- 100%

21

In teaching mathematics to the students in the <TIMSS class>, how often do you usually ask them to do the following?

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

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

a) Memorize formulas and procedures - - - - - - - - - ○ - - ○ - - ○- - -○

b) Solve problems like the examples in their textbooks ○ - - ○ - - ○- - -○

c) Use mathematical terms to represent relationships - - ○ - - ○ - - ○- - -○

d) Discuss problem-solving strategies - - - - - - - - - - - - - ○ - - ○ - - ○- - -○

e) Decide on their own procedures for solving complex problems - - - - - - - - ○ - - ○ - - ○- - -○

f) Communicate their arguments - - - - - - - - - - - - - ○ - - ○ - - ○- - -○

22

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

*Fill in **one** circle for each row*
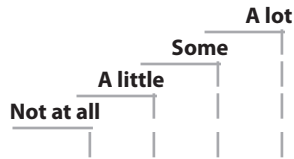
	Not at all	A little	Some	A lot
Students				
a) Students with different academic abilities	○	○	○	○
b) Students who come from a wide range of backgrounds (e.g., economic, language)	○	○	○	○
c) Students with special needs (e.g., hearing, vision, speech impairment, physical or learning disabilities)	○	○	○	○
d) Uninterested students	○	○	○	○
e) Disruptive students	○	○	○	○
Resources				
f) Shortage of graphing calculators	○	○	○	○
g) Shortage of computer hardware	○	○	○	○
h) Shortage of computer software	○	○	○	○
i) Shortage of support for using computers	○	○	○	○
j) Shortage of textbooks for students' use	○	○	○	○
k) Shortage of other instructional equipment for students' use	○	○	○	○
l) Shortage of equipment for your use in demonstrations and other exercises	○	○	○	○
m) Inadequate physical facilities	○	○	○	○
n) High student/teacher ratio	○	○	○	○

23

For <the advanced mathematics track/course that defines the advanced mathematics population> you are teaching the <TIMSS class>, approximately what percentage of teaching time will you have spent on each of the following mathematics content areas by the end of this school year?
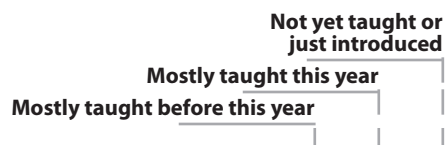
Write in the percent
The total should add to 100%

a) Algebra (e.g., patterns, equations, relationships, and functions) ---------------- _____%

b) Calculus (e.g., limits of functions, first and second derivatives, and evaluating integrals) ------------------------- _____%

c) Geometry (e.g., geometric figures, straight lines and circles in the Cartesian plane, trigonometry, and properties of vectors) ------------------------- _____%

d) Other, please specify:

_____ ---------- _____%

Total -- 100%

24

The following list includes the main topics addressed by the TIMSS advanced mathematics test. Choose the response that best describes when students in the <TIMSS class> have been taught each topic. 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 **one** circle for each row*

Not yet taught or just introduced

Mostly taught this year

Mostly taught before this year

A. Algebra

a) Operations with complex numbers ○ -- ○ -- ○

b) The nth term of numeric and algebraic series and the sums to n terms or infinity of series ○ -- ○ -- ○

c) Problems involving permutations, combinations, and probability ○ -- ○ -- ○

d) Linear, simultaneous, and quadratic equations and inequalities; surd (radical) equations, logarithmic, and exponential equations ○ -- ○ -- ○

e) Equivalent representations of functions as ordered pairs, tables, graphs, formulas, or words ○ -- ○ -- ○

f) Values of functions, including rational functions, for given values and ranges of the variable; function of a function ○ -- ○ -- ○

B. Calculus

a) Limits of functions including rational functions; conditions for continuity and differentiability of functions ○ -- ○ -- ○

b) Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, radical, composite, and parametric functions); differentiation of products and quotients ○ -- ○ -- ○

c) Using derivatives to solve problems (e.g., in kinematics, optimization, and rates of change) ○ -- ○ -- ○

d) Using first and second derivatives to determine gradient, turning points, and points of inflection of functions ○ -- ○ -- ○

e) Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals ○ -- ○ -- ○

C. Geometry

a) Properties of geometric figures; proving geometric propositions in two and three dimensions ○ -- ○ -- ○

b) Gradients, y-axis intercepts, and points of intersection of straight lines in the Cartesian plane ○ -- ○ -- ○

c) Equations and properties of circles in the Cartesian plane; tangents and normals to given points on a circle ○ -- ○ -- ○

d) Trigonometric properties of triangles (sine, cosine, and tangent); solving equations involving trigonometric functions ○ -- ○ -- ○

e) Properties of vectors and their sums and differences ○ -- ○ -- ○

Calculators and Computers in the TIMSS Class

25

During mathematics lessons, how often do you use a computer to demonstrate mathematics for the whole class?
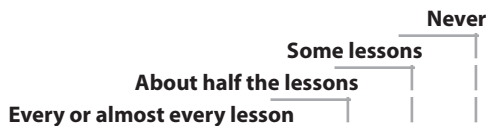
	Every or almost every lesson	About half the lessons	Some lessons	Never
*Fill in **one** circle only*	○	○	○	○

26

A. Do the students in the <TIMSS class> use any of the following during mathematics lessons?

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

	Yes	No
a) Calculators	○	○
b) Computers	○	○
c) Other computing technology	○	○

B. If the students use calculators, what kind of calculators do most of them use?

*Fill in **one** circle only*

Simple calculators – basic functions only (+, –, ×, ÷, %, or $\sqrt{}$), without functions like log, sin, cos ○

Scientific calculators – basic functions (+, –, ×, ÷, %, or $\sqrt{}$) and also functions like log, sin, cos ○

Graphing calculators – scientific and also able to display some graphs ○

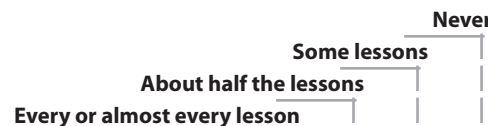Symbolic calculators – graphing and also able to solve expressions in symbolic terms ○

C. If the students use computers, do any of the computers have access to the Internet?

	Yes	No
*Fill in **one** circle only*	○	○

27

How often do students in the <TIMSS class> use calculators or computers in their mathematics lessons for the following activities?

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

	Every or almost every lesson	About half the lessons	Some lessons	Never
a) Drawing graphs of functions	○	○	○	○
b) Solving equations	○	○	○	○
c) Manipulating algebraic expressions	○	○	○	○
d) Modeling and simulation	○	○	○	○
e) Numerical integration	○	○	○	○
f) Processing and analyzing data	○	○	○	○

Homework

28

Do you assign mathematics homework to the <TIMSS class>?

Fill in one circle only - - - - - - - - - - - - - - - - - - - ○ - - - ○

                                 Yes No

If No, please go to question 32

29

How often do you usually assign mathematics homework to the <TIMSS class>?

Fill in one circle only

Every or almost every lesson - - - - - - - - - - - - - - - - - - ○

About half the lessons - ○

Some lessons - ○

30

When you assign mathematics homework to the <TIMSS class>, about how many minutes do you usually assign? (Consider the time it would take an average student in your class.)

Fill in one circle only

30 minutes or less - ○

31-60 minutes - ○

61-90 minutes - ○

More than 90 minutes - ○

31

How often do you assign the following kinds of mathematics homework to the <TIMSS class>?

Fill in one circle for each row

		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	○	○	○

Assessment

32

How much emphasis do you place on the following sources to monitor students' progress in mathematics?

*Fill in **one** circle for each row*
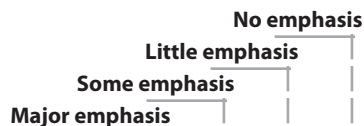
		Major emphasis	Some emphasis	Little emphasis	No emphasis
a)	Classroom tests (e.g., teacher-made or textbook tests)	○	○	○	○
b)	Informal assessment	○	○	○	○
c)	<Other test>	○	○	○	○

33

How often does the <TIMSS class> take a mathematics test or examination for a grade?

*Fill in **one** circle only*

At least once a month - ○

About every other month - - - - - - - - - - - - - - - - - - - ○

About 2 or 3 times a year - - - - - - - - - - - - - - - - - - - ○

Never - ○

34

What item formats do you typically use in your mathematics tests or examinations?

*Fill in **one** circle only*

Only constructed response - - - - - - - - - - - - - - - - - - - ○

Mostly constructed response - - - - - - - - - - - - - - - - - ○

About half constructed response and half objective (e.g., multiple choice) - ○

Mostly objective - ○

Only objective - ○

35

How often do you include the following types of questions in your mathematics tests or examinations?

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

		Always or almost always	Sometimes	Never or almost never
a)	Questions based primarily on recall of facts and procedures	○	○	○
b)	Questions involving application of mathematical procedures	○	○	○
c)	Questions involving searching for patterns and relationships	○	○	○
d)	Questions requiring explanations or justifications	○	○	○

Thank You

**for completing
this questionnaire**

Teacher Questionnaire

Advanced Mathematics