

Identification Label _____

Teacher Name: _____

Class Name: _____

Teacher ID: _____ Teacher Link # _____

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

TIMSS Advanced

2008

Teacher Questionnaire

Physics

<TIMSS Advanced National Research Center Name>

<Address>



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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 physics?

Number of years taught physics

4 _____

How long do you plan to continue teaching physics?

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 major or main area(s) of study?

Fill in **one** circle for each row

- | | Yes | No |
|-----------------------------------|-----|----|
| a) Physics -----○ | ○ | ○ |
| b) Chemistry -----○ | ○ | ○ |
| c) Biology -----○ | ○ | ○ |
| d) Engineering -----○ | ○ | ○ |
| e) Education - Science -----○ | ○ | ○ |
| f) Mathematics -----○ | ○ | ○ |
| g) Education - Mathematics -----○ | ○ | ○ |
| h) Education - General -----○ | ○ | ○ |
| i) Other -----○ | ○ | ○ |

7 _____

Do you have a teaching license or certificate?

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

Preparation to Teach (Continued)

8

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

Fill in **one** circle for each row

Not well prepared
Somewhat prepared
Very well prepared

A. Mechanics

- a) The conditions for equilibrium and the dynamics of different types of movement ----- ○ -- ○ -- ○
- b) Kinetic and potential energy; conservation of mechanical energy ----- ○ -- ○ -- ○
- c) Mechanical wave phenomena in sound, water, and strings; the relationship between speed, frequency, and wavelength; refraction ----- ○ -- ○ -- ○
- d) Forces, including frictional force, acting on a moving body ----- ○ -- ○ -- ○
- e) Forces acting on a body moving in a circular path; the body's centripetal acceleration, speed, and circling time; the law of gravitation in relation to the movement of planets ----- ○ -- ○ -- ○
- f) Elastic and inelastic collision; the law of conservation of momentum and the law of conservation of mechanical (i.e., kinetic) energy ----- ○ -- ○ -- ○
- g) Aspects of relativity (e.g., length contraction and time dilatation for an object moving with constant speed in relation to the observer) ----- ○ -- ○ -- ○

B. Electricity and Magnetism

- a) Electrostatic attraction or repulsion between isolated charged particles – Coulomb's law ----- ○ -- ○ -- ○
- b) Electrical circuits – Ohm's law and Joule's law for complex electrical circuits ----- ○ -- ○ -- ○
- c) Charged particles in a magnetic field; relationship between magnetism and electricity; Faraday's and Lenz' laws of induction ----- ○ -- ○ -- ○
- d) Electromagnetic radiation; wavelength and frequency of various types of waves (e.g., radio, infrared, x-rays, light) ----- ○ -- ○ -- ○

C. Heat and Temperature

- a) Difference between heat and temperature; heat transfer and specific heat capacities; evaporation and condensation ----- ○ -- ○ -- ○
- b) Expansion of solids and liquids in relation to temperature change; the law of ideal gases; the first law of thermodynamics ----- ○ -- ○ -- ○
- c) Heat ("black body") radiation and temperature ----- ○ -- ○ -- ○

D. Atomic and Nuclear Physics

- a) The structure of the atom and its nucleus in terms of electrons, protons, and neutrons; atomic number and atomic mass number ----- ○ -- ○ -- ○
- b) Light emission and absorption and the behavior of electrons; the photoelectric effect ----- ○ -- ○ -- ○
- c) Types of nuclear reactions (i.e., fission, fusion, and radioactive decay) and their role in nature (e.g., in stars) and society (e.g., reactors, bombs); radioactive isotopes ----- ○ -- ○ -- ○

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

- | | | |
|--|------------------------|--|
| | Daily or almost daily | |
| | 1-3 times per week | |
| | 2 or 3 times per month | |
| | Never or almost never | |
- 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 physics teachers>?

No
Yes

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

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

No
Yes

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) Physics content ----- --
 - b) Physics pedagogy/instruction ----- --
 - c) Physics curriculum ----- --
 - d) Integrating information technology into physics ----- --
 - e) Improving students' critical thinking or inquiry skills ----- --
 - f) Physics assessment ----- --

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

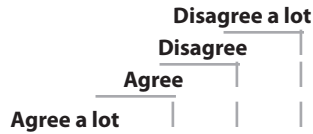
Fill in **one** circle for each row

- | | | |
|--|-----|----|
| | 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 physics (e.g., email, forums, website) ----- --

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

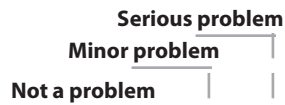


- a) This school is located in a safe neighborhood ----- ○ -- ○ -- ○ -- ○
- b) I feel safe at this school ----- ○ -- ○ -- ○ -- ○
- c) This school's security policies and practices are sufficient - ○ -- ○ -- ○ -- ○

14

In your current school, how severe is each problem?

Fill in **one** circle for each row

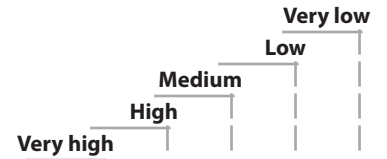


- a) The school building needs significant repair----- ○ -- ○ -- ○
- b) Classrooms are overcrowded----- ○ -- ○ -- ○
- c) Teachers do not have adequate workspace outside their classroom ----- ○ -- ○ -- ○
- d) Materials are not available to conduct physics experiments or investigations----- ○ -- ○ -- ○

15

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

Fill in **one** circle for each row



- 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 physics 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 physics 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 physics 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 physics theory from their textbooks	-----○--○--○-----○	

Teaching Physics to the TIMSS Class

20

In a typical week of physics lessons for the <TIMSS class>, what percentage of time do students spend 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%

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In teaching physics 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

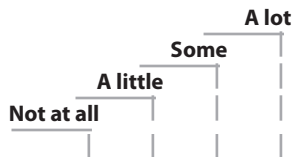
About half the lessons

Every or almost every lesson

- a) Watch me demonstrate an experiment or investigation ----- ○ -- ○ -- ○ -- ○
- b) Conduct experiments or investigations ----- ○ -- ○ -- ○ -- ○
- c) Use laws and formulas of physics to solve routine problems ----- ○ -- ○ -- ○ -- ○
- d) Give explanations about something they are studying ----- ○ -- ○ -- ○ -- ○
- e) Relate what they are learning in physics to their daily lives ----- ○ -- ○ -- ○ -- ○
- f) Have students memorize formulas and procedures --- ○ -- ○ -- ○ -- ○
- g) Read their textbooks or other resource materials --- ○ -- ○ -- ○ -- ○

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

Fill in **one** circle for each row



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 - ○ -- ○ -- ○ -- ○

For <the physics track/course that defines the physics population> you are teaching the <TIMSS class>, approximately what percentage of teaching time will you have spent on each of the following physics content areas by the end of this school year?

Write in the percent
The total should add to 100%

- a) Mechanics (e.g., conditions for equilibrium and dynamics of movement, kinetic and potential energy, mechanical waves, forces on moving bodies, conservation of energy, and aspects of relativity)----- _____%
- b) Electricity and Magnetism (e.g., Coulomb's law, Ohm's law, Joule's law, charged particles in magnetic fields, Faraday's and Lenz' laws of induction, and electromagnetic radiation)----- _____%
- c) Heat and Temperature (e.g., heat transfer and specific heat, expansion of solids and liquids, the ideal gas laws, the first law of thermodynamics, heat radiation and temperature) ----- _____%
- d) Atomic and Nuclear Physics (e.g., structure of the atom and its nucleus, atomic number and atomic mass number, the photoelectric effect and the behavior of electrons, types of nuclear reaction and their role in nature and society)----- _____%
- e) Other, please specify:
_____ %

Total ----- 100%

The following list includes the main topics addressed by the TIMSS physics 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. Mechanics

- a) The conditions for equilibrium and the dynamics of different types of movement ----- -- --
- b) Kinetic and potential energy; conservation of mechanical energy ----- -- --
- c) Mechanical wave phenomena in sound, water, and strings; the relationship between speed, frequency, and wavelength; refraction ----- -- --
- d) Forces, including frictional force, acting on a moving body ----- -- --
- e) Forces acting on a body moving in a circular path; the body's centripetal acceleration, speed, and circling time; the law of gravitation in relation to the movement of planets ----- -- --
- f) Elastic and inelastic collision; the law of conservation of momentum and the law of conservation of mechanical (i.e., kinetic) energy ----- -- --
- g) Aspects of relativity (e.g., length contraction and time dilatation for an object moving with constant speed in relation to the observer) ----- -- --

B. Electricity and Magnetism

- a) Electrostatic attraction or repulsion between isolated charged particles – Coulomb's law ----- -- --
- b) Electrical circuits – Ohm's law and Joule's law for complex electrical circuits ----- -- --
- c) Charged particles in a magnetic field; relationship between magnetism and electricity; Faraday's and Lenz' laws of induction ----- -- --
- d) Electromagnetic radiation; wavelength and frequency of various types of waves (e.g., radio, infrared, x-rays, light) ----- -- --

C. Heat and Temperature

- a) Difference between heat and temperature; heat transfer and specific heat capacities; evaporation and condensation ----- -- --
- b) Expansion of solids and liquids in relation to temperature change; the law of ideal gases; the first law of thermodynamics ----- -- --
- c) Heat ("black body") radiation and temperature ----- -- --

D. Atomic and Nuclear Physics

- a) The structure of the atom and its nucleus in terms of electrons, protons, and neutrons; atomic number and atomic mass number ----- -- --
- b) Light emission and absorption and the behavior of electrons; the photoelectric effect ----- -- --
- c) Types of nuclear reactions (i.e., fission, fusion, and radioactive decay) and their role in nature (e.g., in stars) and society (e.g., reactors, bombs); radioactive isotopes ----- -- --

Calculators and Computers in the TIMSS Class

25

During physics lessons, how often do you use a computer to demonstrate physics for the whole class?

Never

Some lessons

About half the lessons

Every or almost every lesson

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

26

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

Fill in **one** circle for each row

- No
- Yes
- 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 $\sqrt{\quad}$), without functions like log, sin, cos ----- ○
- Scientific calculators – basic functions (+, -, ×, ÷, %, or $\sqrt{\quad}$) 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?

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

27

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

Fill in **one** circle for each row

- Never
- Some lessons
- About half the lessons
- Every or almost every lesson
- a) Doing scientific procedures or experiments ----- ○ -- ○ -- ○ -- ○
- b) Modeling and simulations -- ○ -- ○ -- ○ -- ○
- c) Solving equations ----- ○ -- ○ -- ○ -- ○
- d) Processing and analyzing data ----- ○ -- ○ -- ○ -- ○

Homework

28 _____

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

Yes
No

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

If **No**, please go to question **32**

29 _____

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

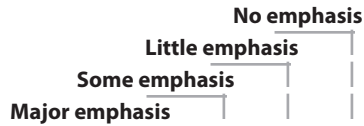
Fill in one circle for each row

	Never or almost never	
	Sometimes	
	Always or almost always	
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 -----○	○	○

32

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

Fill in **one** circle for each row



- 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 physics 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

A. What item formats do you typically use in your physics 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-----○

B. How often do your physics tests or examinations include a practical examination or laboratory problems?

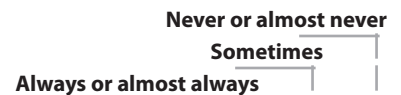
Fill in **one** circle only

- Always or almost always-----○
- Sometimes -----○
- Never or almost never -----○

35

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

Fill in **one** circle for each row

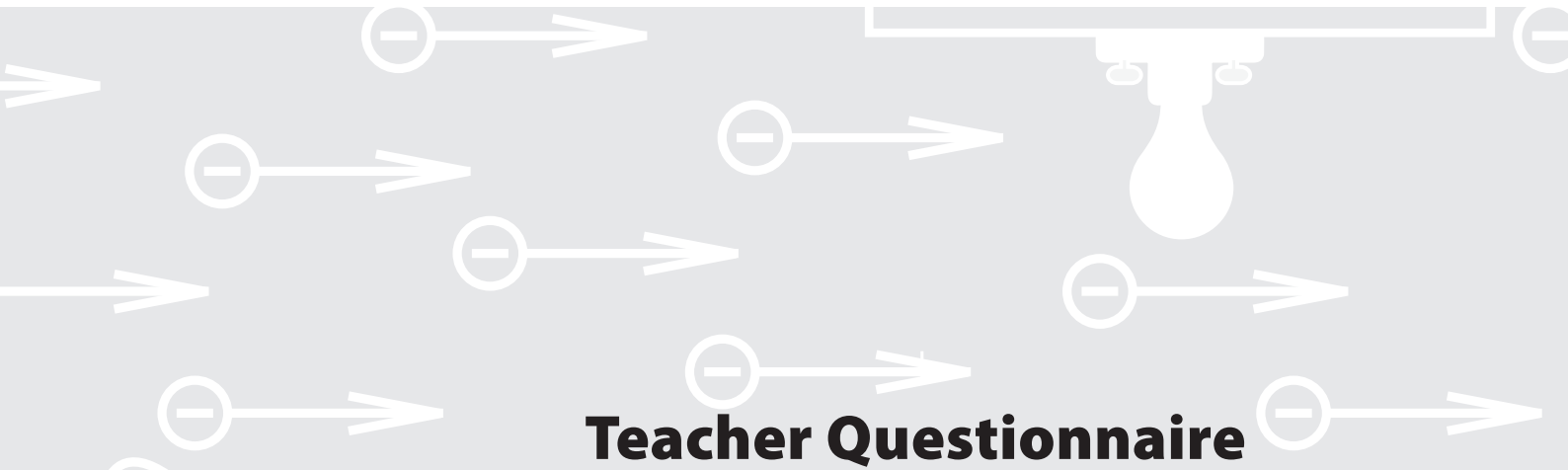


- a) Questions based on knowing facts and concepts -----○ -- ○ -- ○
- b) Questions based on the application of knowledge and understanding -----○ -- ○ -- ○
- c) Questions involving developing hypotheses and designing scientific investigations -----○ -- ○ -- ○
- d) Questions requiring explanations or justifications -----○ -- ○ -- ○

Thank You
for completing
this questionnaire



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



Teacher Questionnaire



Physics