

Memorandum

To: Shelley Martinez, OMB
Through: Kashka Kubzdela, NCES
From: Stephen Provasnik, NCES
Date: October 16, 2014
Re: 2015 Trends in International Mathematics and Science Study (TIMSS:2015) Main Study – Final Questionnaire Versions Change Request (OMB# 1850-0695 v.6)

This submission updates the 2015 Trends in International Mathematics and Science Study (TIMSS:2015) Main Study clearance package approved in September 2014 (OMB# 1850-0695 v.5) with the final versions of grades 4, 8, and 12 questionnaires. The updated Appendix C provides the final versions of the:

- U.S.-adapted TIMSS:2015 Main Study background questionnaires (for grades 4 and 8), and
- U.S.-adapted TIMSS:2015 Advanced Main Study background questionnaires (for grade 12).

These final background questionnaires reflect all U.S. adaptations that have been made to the international versions of the TIMSS and TIMSS Advanced instruments. The U.S. adaptations have been reviewed and accepted by the International Association for the Evaluation of Educational Achievement (IEA), which is in charge of TIMSS. NCES submitted a list of all proposed U.S. adaptations along with drafts of the international versions of these instruments to OMB in July 2014.

Per the revisions made to the OMB# 1850-0695 v.5 clearance package before it was approved, and per the second 30-day public comment period announced in the Federal Register on August 27, 2014, the final questionnaires include the small set of items that was added at the request of the TIMSS and TIMSS Advanced National Research Coordinators (NRCs) at the 5th TIMSS NRC meeting in August 2014.

This submission only provides the final versions of the questionnaires. There are no accompanying changes to the TIMSS:2015 materials, procedures, respondent burden, or costs to the federal government from those described in the approved clearance package (OMB# 1850-0695 v.5).

Below we include a finalized list of the differences between the questionnaires that will be used in the main study from those that were used in the field test (these changes were reflected in Appendices C1, C2, and C3 of the OMB# 1850-0695 v.5 approved package; below is their final wording):

School questionnaires

Changes to Grade 4, 8, and 12 background questionnaire sections and questions:

1. Section header changed from “**School Climate**” to “**School Discipline and Safety**.”
2. Added a new question for the Main Study:

ScQ16 (MS) - To what degree is each of the following a problem among teachers in your school?

Fill in only one circle only.

ScQ16a (MS) Arriving late or leaving early
ScQ16b (MS) Absenteeism

With response options:

1. Not a problem
2. Minor problem
3. Moderate problem
4. Serious problem

3. Removed an entire question used in the Field Test:

~~ScQ16 (FT) — During the past year, approximately how much time have you spent on the following school leadership activities in your role as a school principal?~~

~~Fill in one circle for each line.~~

~~ScQ 16a (FT) — Promoting the school's educational vision or goals~~

~~ScQ 16b (FT) — Developing the school's curricular and educational goals~~

~~ScQ 16c (FT) — Monitoring teachers' implementation of the school's educational goals _____
_____ in their teaching~~

~~ScQ 16d (FT) — Monitoring students' learning progress to ensure that the school's _____
_____ educational goals are reached~~

~~ScQ 16e (FT) — Keeping an orderly atmosphere in the school~~

~~ScQ 16f (FT) — Addressing disruptive student behavior~~

~~ScQ 16g (FT) — Advising teachers who have questions or problems with their teaching~~

~~ScQ 16h (FT) — Initiating educational projects or improvements~~

~~ScQ 16i (FT) — Participating in professional development activities specifically for _____
_____ school principals~~

4. Added a new section for the Main Study:

Principal Experience and Education

5. Added a new question for the Main Study:

ScQ17 (MS) By the end of this school year, how many years will you have been a principal altogether?

Please round to the nearest whole number.

With response option:

_____ years

6. Added a new question for the Main Study:

ScQ18 (MS) By the end of this school year, how many years will you have been a principal at this school?

Please round to the nearest whole number.

With response option:

_____ years

7. Added a new question for the Main Study:

ScQ19 (MS) - What is the highest level of formal education you have completed?

Fill in one circle only.

With response options:

1. Did not complete Bachelor's degree (4-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.)

8. Added a new question for the Main Study:

ScQ20 (MS) - Do you hold the following degrees in educational leadership?

Fill in one circle for each row.

- ScQ-20a Master's degree or professional degree (MD, DDS, lawyer, minister)
ScQ-20b Doctorate (Ph.D., or Ed.D.)

With response options:

1. Yes
2. No

Changes to Grade 12 school background questionnaire:

1. Removed three response categories from the following question used in the Field Test:

ScQ12 (FT&MS) - 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.

- ~~ScQ12b (FT) — The school has teachers qualified to teach advanced mathematics and physics~~
- ~~ScQ12c (FT) — The school has the technological resources necessary to teach advanced mathematics and physics~~
- ~~ScQ12j (FT) — Parents expect their children to study advanced mathematics and physics~~

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

Teacher questionnaires

Changes to sections and questions in the Grade 4, 8, and 12 background questionnaires:

1. Consolidates parts of separate questions in the Field Test into a single question for the Main Study:

TQ11 (MS) - Indicate the extent to which you agree or disagree with each of the following statements.

Fill in only one circle only.

- TQ11a (MS) There are too many students in the classes**
- TQ11b (MS) I have too much material to cover in class**
- TQ11c (MS) I have too many teaching hours**
- TQ11d (MS) I need more time to prepare for class**
- TQ11e (MS) I need more time to assist individual students**
- TQ11f (MS) I feel too much pressure from parents**
- TQ11g (MS) I have difficulty keeping up with all of the changes to the curriculum**
- TQ11h (MS) I have too many administrative tasks**

With response options:

- 1. Agree a lot**
- 2. Agree a little**
- 3. Disagree a little**
- 4. Disagree a lot**

2. Removed these response categories used in the Field Test from the following question:
TQ13 (FT); TQ14 (MS) - How often do you do the following in teaching this class?

Fill in only one circle for each row.

- ~~**TQ13a (FT) Summarize what students should have learned from the lesson**~~
- ~~**TQ13b (FT) Ask questions to elicit reasons and explanations**~~
- ~~**TQ13c (FT) Ask questions to check that students understand what I am teaching**~~
- ~~**TQ13d (FT) Encourage all students to improve their performance**~~
- ~~**TQ13e (FT) Praise students for good performance**~~

With response options:

- 1. Every or almost every lesson
- 2. About half the lessons
- 3. Some lessons
- 4. Never

3. Changed category responses from the following question used in the Field Test:
TQ14 (FT); TQ15 (MS) - In your view, to what extent do the following limit how you teach this class?

Fill in only one circle for each row.

- ~~**TQ14d (FT) Students with special needs (e.g., physical disabilities, mental or emotional/psychological impairment)**~~

Changed to

- TQ15d (MS) Students with physical disabilities**
- TQ15e (MS) Students with mental, emotional, or psychological disabilities**

With response options:

- 1. Not at all
- 2. Some
- 3. A lot

Changes to sections and questions in the Grade 12 teacher background questionnaires:

1. Removed one response option from the following question used in the Field Test:

TQ04 (FT&MS): What is the highest level of formal education you have completed?

Response option dropped: ~~High school graduate~~

1. Removed three response categories from the following question used in the Field Test:

TQ06 (FT&MS) - 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.

~~TQ06b (FT) — The school has teachers qualified to teach advanced mathematics and physics~~

~~TQ06c (FT) — The school has the technological resources necessary to teach advanced~~

~~mathematics and physics~~

~~TQ06i (FT) — Students desire to do well in advanced mathematics and physics~~

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

2. Section header changed from “**School Climate**” to “**School Environment.**”

3. Removed three response categories from the following question used in the Field Test:

TQ08 (FT&MS) - In your current school, how severe is each problem?

Fill in only one circle for each row.

~~TQ08h (FT) — There are too many students in the classes~~

~~TQ08i (FT) — Teachers have too many teaching hours~~

~~TQ08j (FT) — Teachers have too much material to cover in classes~~

With response options:

1. Not a problem
2. Minor problem
3. Moderate problem
4. Serious problem

- 4.—Removed these response categories from the following question used in the Field Test:

TQ09 (FT&MS) - How often do you have the following types of interactions with other teachers?

Fill in only one circle for each row.

~~TQ09f (FT) — Go to other teachers for help~~

~~TQ09i (FT) — Participate in teacher mentoring~~

With response options:

1. Very Often
2. Often
3. Sometimes
4. Never or almost never

5. Removed these response categories from the following question used in the Field Test:

TQ10 (FT&MS) - How frequently do you feel the following way about being a teacher?

Fill in only one circle for each row.

~~TQ10g (FT) — I am frustrated as a teacher~~

~~TQ10h (FT) — I am supported by the teachers at my school~~

With response options:

1. Very Often
2. Often
3. Sometimes
4. Never or almost never

4. Added these response categories for the Main Study:

TQ13 (FT); TQ14 (MS) - How often do you do the following in teaching this class?

Fill in only one circle for each row.

TQ14a (MS) Relate the lesson to students' daily lives

TQ14b (MS) Ask students to explain their answers

With response options:

1. Every or almost every lesson
2. About half the lessons
3. Some lessons
4. Never

5. Removed these response categories from the following question used in the Field Test:

TQ17 (FT); TQ18 (MS) - In teaching advanced mathematics/physics to this class, how confident do you feel to do the following?

Fill in only one circle for each row.

~~TQ17a (FT) — Answer students' questions about advanced mathematics/physics~~

~~TQ17i (FT) — Build supportive relationships with students~~

~~TQ17j (FT) — Manage the classroom to avoid disruptions~~

With response options:

1. Very confident
2. Somewhat confident
3. Not confident

6. Added a response category for the Main Study:

TQ17 (FT); TQ18 (MS) - In teaching advanced mathematics/physics to this class, how confident do you feel to do the following?

Fill in only one circle for each row.

TQ18a (MS) Inspiring students to learn advanced mathematics/physics

With response options:

1. Very confident

2. Somewhat confident
3. Not confident

7. Section header changed from “Resources for Teaching Mathematics/Physics” to “Technology for Teaching Mathematics/Physics to the TIMSS class.”
8. Removed an entire question used in the Field Test:

~~TQ19A (FT) — When you teach advanced mathematics/physics to this class, how do you use the following resources?~~

Fill in only one circle only.

~~TQ-19Aa (FT) — Textbooks~~

~~TQ-19Ab (FT) — Workbooks or worksheets~~

~~TQ-19Ac (FT) — Computer software/applications (apps) for mathematics instruction~~

~~TQ-19Ad (FT) — Internet resources~~

With response options:

1. Basis for instruction
2. Supplement
3. Not used

9. Removed an entire question used in the Field Test:

~~TQ19B (FT) — How often do you require students to do the following?~~

Fill in only one circle only.

~~TQM-19Ba (FT) — Do problems or exercises~~

~~TQM-19Bb (FT) — Read examples of how to do problems or exercises~~

~~TQM-19Bc (FT) — Read about mathematical theory~~

With response options:

1. Every or almost every lesson
2. About half the lessons
3. Some lessons
4. Never

10. Section header changed from “Mathematics/Physics Homework to “Mathematics/Physics Homework for the TIMSS class.”
11. Removed this response category from the following question used in the Field Test:

TQM27/TQP28 (FT&MS) - 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.

~~TQM27c/TQP28c (FT) — I published an article in a journal or magazine for teachers (print or online)~~

With response options:

1. Yes
2. No
- 3.

Changes to sections and questions in the Grade 12 Calculus teacher background questionnaire:

1. Removed these response categories from the following question used in the Field Test:

ScQ18 (FT); ScQ19 (MS) - 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.

- ~~_____ TQM18h (FT) Explain their answers~~
- ~~_____ TQM18j (FT) Relate what they are learning in mathematics to their daily lives~~
- ~~_____ TQM18k (FT) Decide on their own procedures for solving complex problems~~

With response options:

1. Every or almost every lesson
2. About half the lessons
3. Some lessons
4. Never

2. Changed response categories in the following question used in the Field Test:

TQM21 (FT&MS) - 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.

- TQM21A Algebra**
 - TQM21Aa Operations with exponential, logarithmic, polynomial, rational, and radical expressions; complex numbers**
 - TQM21Ab Evaluate algebraic expressions (e.g., exponential, logarithmic, polynomial, rational, and radical)**
 - TQM21Ac The nth term of numeric and algebraic series and the sums to n terms or infinity of series**
 - TQM21Ad Linear, simultaneous, and quadratic equations and inequalities; surd (radical) equations, logarithmic, and exponential equations**
 - TQM21Ae Equivalent representations of functions as ordered pairs, tables, graphs, formulas, or words**
 - TQM21Af Values of functions, including rational functions, for given values and ranges of the variable; function of a function**
- TQM21B Calculus**
 - TQM21Ba Limits of functions including rational functions; conditions for continuity and differentiability of functions**

- TQM21Bb Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, radical, composite, and parametric functions); differentiation of products and quotients
- TQM21Bc Using derivatives to solve problems (e.g., in kinematics, optimization, and rates of change)
- TQM21Bd Using first and second derivatives to determine gradient, turning points, and points of inflection of functions
- TQM21Be Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals
- TQM21C Geometry
 - TQM21Ca Properties of geometric figures; proving geometric propositions in two and three dimensions
 - TQM21Cb Gradients, y-axis intercepts, and points of intersection of straight lines in the Cartesian plane
 - TQM21Cc Equations and properties of circles in the Cartesian plane; tangents and normals to given points on a circle
 - TQM21Cd Properties of vectors and their sums and differences
 - TQM21Ce Trigonometric properties of triangles (sine, cosine, and tangent); solving equations involving trigonometric functions
 - TQM21Cf Graphs of sine, cosine, and tangent functions

Changed to

- TQM21A Algebra
 - TQM21Aa Operations with exponential, logarithmic, polynomial, rational, and radical expressions
 - TQM21Ab Operations with complex numbers
 - TQM21Ac Evaluating algebraic expressions (e.g., exponential, logarithmic, polynomial, rational, and radical)
 - TQM21Ad The n th term of arithmetic and geometric sequences and the sums of finite and infinite series
 - TQM21Ae Linear, simultaneous, and quadratic equations and inequalities; radical equations, logarithmic, and exponential equations
 - TQM21Af Slopes, y-axis intercepts, and points of intersection of straight lines
 - TQM21Ag Equivalent representations of functions, including composite functions, as ordered pairs, tables, graphs, formulas, or words
 - TQM21Ah Properties of functions including domain and range
- TQM21B Calculus
 - TQM21Ba Limits of functions
 - TQM21Bb Conditions for continuity and differentiability of functions
 - TQM21Bc Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, and radical functions); differentiation of products, quotients, and composite functions
 - TQM21Bd Using derivatives to solve problems (e.g., in optimization and rates of change)
 - TQM21Be Using first and second derivatives to determine slope and local extrema of functions
 - TQM21Bf Using derivatives to determine points of inflection of functions
 - TQM21Bg Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals, including calculation of areas
- TQM21C Geometry
 - TQM21Ca Properties of geometric figures in two and three dimensions

- TQM21Cb Properties of vectors and their sums and differences
- TQM21Cc Trigonometric properties of triangles (sine, cosine, and tangent)
- TQM21Cd Trigonometric functions and their graphs

With response options:

1. Mostly taught before this year
 2. Mostly taught this year
 3. Not yet taught or just introduced
3. Removed the section **Preparation to Teach Advanced Mathematics/Physics** by dropping the one question in this section used in the Field Test:

TQM28 (FT) – How well prepared do you feel you are to teach the following mathematics topics? If a topic is not in the curriculum for this class or you are not responsible for teaching this topic, please choose “Not applicable.”

Fill in only one circle only.

TQM28A — Algebra

- ~~TQM28Aa Operations with exponential, logarithmic, polynomial, rational, and radical expressions; complex numbers~~
- ~~TQM28Ab Evaluate algebraic expressions (e.g., exponential, logarithmic, polynomial, rational, and radical)~~
- ~~TQM28Ac The nth term of numeric and algebraic series and the sums to n terms or infinity of series~~
- ~~TQM28Ad Linear, simultaneous, and quadratic equations and inequalities; surd (radical) equations, logarithmic, and exponential equations~~
- ~~TQM28Ae Equivalent representations of functions as ordered pairs, tables, graphs, formulas, or words~~
- ~~TQM28Af Values of functions, including rational functions, for given values and ranges of the variable; function of a function~~

TQM28B — Calculus

- ~~TQM28Ba Limits of functions including rational functions; conditions for continuity and differentiability of functions~~
- ~~TQM28Bb Differentiation of functions (including polynomial, exponential, logarithmic, trigonometric, rational, radical, composite, and parametric functions); differentiation of products and quotients~~
- ~~TQM28Bc Using derivatives to solve problems (e.g., in kinematics, optimization, and rates of change)~~
- ~~TQM28Bd Using first and second derivatives to determine gradient, turning points, and points of inflection of functions~~
- ~~TQM28Be Integrating functions (including polynomial, exponential, trigonometric, and rational functions); evaluating definite integrals~~

TQM28C — Geometry

- ~~TQM28Ca Properties of geometric figures; proving geometric propositions in two and three dimensions~~
- ~~TQM28Cb Gradients, y-axis intercepts, and points of intersection of straight lines in the Cartesian plane~~
- ~~TQM28Cc Equations and properties of circles in the Cartesian plane; tangents and normals to given points on a circle~~
- ~~TQM28Cd Properties of vectors and their sums and differences~~

~~TQM28Ce Trigonometric properties of triangles (sine, cosine, and tangent); solving equations involving trigonometric functions~~

~~TQM28Cf Graphs of sine, cosine, and tangent functions~~

With response options:

1. Not applicable
2. Very well prepared
3. Somewhat prepared
4. Not well prepared

Changes to sections and questions in the Grade 12 Physics teacher background questionnaire:

1. Removed these response categories from the following question used in the Field Test:

ScQ18 (FT); ScQ19 (MS) - 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.

~~TQM18l (FT) Give explanations about something they are studying~~

~~TQM18m (FT) Relate what they are learning in physics to their daily lives~~

With response options:

1. Every or almost every lesson
 2. About half the lessons
 3. Some lessons
 4. Never
2. Changed category responses in the following question used in the Field Test:
TQ22 (FT&MS) - The following list includes the main topics addressed by the TIMSS Advanced physics 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."

TQP-22A Mechanics and Thermodynamics

TQP-22Aa The dynamics of different types of movement, including Newton's laws of motion

TQP-22Ab Forces, including frictional force, acting on a moving body

TQP-22Ac Forces acting on a body moving in a circular path; the body's centripetal acceleration, speed, and circling time

TQP-22Ad The law of gravitation in relation to the movement of celestial objects

TQP-22Ae Kinetic and potential energy; conservation of mechanical energy

TQP-22Af Elastic and inelastic collision; the law of conservation of momentum

TQP-22Ag The first law of thermodynamics

TQP-22Ah Heat transfer and specific heat capacities

TQP-22Ai Expansion of solids and liquids in relation to temperature change; the law of ideal gases

TQP-22B Electricity and Magnetism

- TQP-22Ba Electrostatic attraction or repulsion between isolated charged particles – Coulomb’s law
- TQP-22Bb Charged particles in an electric field
- TQP-22Bc Electrical circuits – Ohm’s law and Joule’s law for complex electrical circuits
- TQP-22Bd Charged particles in a magnetic field
- TQP-22Be Relationship between magnetism and electricity; electromagnetic induction; Faraday’s and Lenz’ laws of induction
- TQP-22C Wave Phenomena and Atomic/Nuclear Physics
 - TQP-22Ca Mechanical waves; the relationship between speed, frequency, and wavelength
 - TQP-22Cb Electromagnetic radiation; wavelength and frequency of various types of waves (e.g., radio, infrared, x-rays, light)
 - TQP-22Cc Thermal radiation, temperature, and wavelength
 - TQP-22Cd Reflection, refraction, interference, and diffraction
 - TQP-22Ce The structure of the atom and its nucleus in terms of electrons, protons, and neutrons; atomic number and atomic mass number; Light emission and absorption and the behavior of electrons
 - TQP-22Cf Wave-particle quality and the photoelectric effect; 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
 - TQP-22Cg Mass-energy equivalence

Changed to

- TQP-22A Mechanics and Thermodynamics
 - TQP-22Aa Applying Newton’s laws and laws of motion
 - TQP-22Ab Forces, including frictional force, acting on a body
 - TQP-22Ac Forces acting on a body moving in a circular path; the body’s centripetal acceleration, speed, and circling time
 - TQP-22Ad The law of gravitation in relation to the movement of celestial objects
 - TQP-22Ae Kinetic and potential energy; conservation of mechanical energy
 - TQP-22Af The law of conservation of momentum; elastic and inelastic collisions
 - TQP-22Ag The first law of thermodynamics
 - TQP-22Ah Heat transfer and specific heat capacities
 - TQP-22Ai The law of ideal gases; expansion of solids and liquids in relation to temperature change
- TQP-22B Electricity and Magnetism
 - TQP-22Ba Electrostatic attraction or repulsion between isolated charged particles – Coulomb’s law
 - TQP-22Bb Charged particles in an electric field
 - TQP-22Bc Electrical circuits; using Ohm’s law and Joule’s law
 - TQP-22Bd Charged particles in a magnetic field
 - TQP-22Be Relationship between magnetism and electricity; magnetic fields around electric conductors; electromagnetic induction
 - TQP-22Bf Faraday’s and Lenz’s laws of induction
- TQP-22C Wave Phenomena and Atomic/Nuclear Physics
 - TQP-22Ca Mechanical waves; the relationship between speed, frequency, and wavelength
 - TQP-22Cb Electromagnetic radiation; wavelength and frequency of various types of waves (radio, infrared, visible light, x-rays, gamma rays)
 - TQP-22Cc Thermal radiation, temperature, and wavelength

TQP-22Cd	Reflection, refraction, interference, and diffraction
TQP-22Ce	The structure of the atom and its nucleus; atomic number and atomic mass; electromagnetic emission and absorption and the behavior of electrons
TQP-22Cf	Wave-particle duality and the photoelectric effect; types of nuclear reactions and their role in nature (e.g., in stars) and society; radioactive isotopes
TQP-22Cg	Mass-energy equivalence in nuclear reactions and particle transformations

With response options:

1. Mostly taught before this year
 2. Mostly taught this year
 3. Not yet taught or just introduced
4. Removed the section **Preparation to Teach Advanced Mathematics/Physics** by dropping the one question in this section used in the Field Test:

ScQ29 (FT) – How well prepared do you feel you are to teach the following physics topics?

If a topic is not in the curriculum for this class or you are not responsible for teaching this topic, please choose “Not applicable.”

Fill in only one circle only.

TQP-29A	Mechanics and Thermodynamics
TQP-29Aa	The dynamics of different types of movement, including Newton’s laws of motion
TQP-29Ab	Forces, including frictional force, acting on a moving body
TQP-29Ac	Forces acting on a body moving in a circular path; the body’s centripetal acceleration, speed, and circling time
TQP-29Ad	The law of gravitation in relation to the movement of celestial objects
TQP-29Ae	Kinetic and potential energy; conservation of mechanical energy
TQP-29Af	Elastic and inelastic collision; the law of conservation of momentum
TQP-29Ag	The first law of thermodynamics
TQP-29Ah	Heat transfer and specific heat capacities
TQP-29Ai	Expansion of solids and liquids in relation to temperature change; the law of ideal gases
TQP-29B	Electricity and Magnetism
TQP-29Ba	Electrostatic attraction or repulsion between isolated charged particles – Coulomb’s law
TQP-29Bb	Charged particles in an electric field
TQP-29Bc	Electrical circuits – Ohm’s law and Joule’s law for complex electrical circuits
TQP-29Bd	Charged particles in a magnetic field
TQP-29Be	Relationship between magnetism and electricity; electromagnetic induction; Faraday’s and Lenz’ laws of induction
TQP-29C	Wave Phenomena and Atomic/Nuclear Physics
TQP-29Ca	Mechanical waves; the relationship between speed, frequency, and wavelength
TQP-29Cb	Electromagnetic radiation; wavelength and frequency of various types of waves – (e.g., radio, infrared, x-rays, light)
TQP-29Cc	Thermal radiation, temperature, and wavelength
TQP-29Cd	Reflection, refraction, interference, and diffraction

~~TQP-29Ce The structure of the atom and its nucleus in terms of electrons, protons, and neutrons; atomic number and atomic mass number; Light emission and absorption and the behavior of electrons~~
~~TQP-29Cf Wave-particle quality and the photoelectric effect; 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~~
~~TQP-29Cg Mass-energy equivalence~~

With response options:

1. Not applicable
2. Very well prepared
3. Somewhat prepared
4. Not well prepared

Student questionnaires

Changes to sections and questions in the Grade 4, 8, and 12 background questionnaires:

1. Added an additional response option to these questions for the Main Study version:

SQ09A (MS) - What is the highest level of education completed by your mother (or stepmother or female legal guardian)?

SQ09B (MS) - What is the highest level of education completed by your father (or father or male legal guardian)?

Fill in one oval only.

I don't know.

2. Changed a response option from the question used in the Field Test:

SQ10 (FT&MS) - What kind of work do your father (or stepfather or male legal guardian) and mother (or stepmother or female legal guardian) do for their main jobs?

For each, fill the circle for the job category that best describes what he/she does. Each category has a few examples to help you decide the correct category. If your father or mother is not working now, think about the last job he/she had.

Fill in only one oval for each column.

Not applicable

Changed to

I don't know

Changes to Grade 12 student background questionnaires sections and questions:

1. Added a new question for the Main Study:

SQ19C (MS) - For how many of the last 12 months have you attended extra lessons or tutoring in advanced mathematics?

Fill in one oval only.

1. Less than 4 months
2. 4-8 months
3. More than 8 months

2. Moved and reworded a response category used in the Field Test:

SQ22 (FT) - How much do you agree with these statements about the advanced mathematics/physics you are studying?

Fill in one oval for each row.

SQ22i (FT) I like the way advanced mathematics/physics is taught in my class

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

Moved and changed to:

SQ20 (MS) - How much do you agree with these statements about your advanced mathematics lessons?

Fill in one oval for each row.

SQ20o (MS) I like the way my teacher teaches mathematics/physics

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

3. Removed response categories used in the Field Test:

SQ21 (FT); SQ23 (MS) - How much do you agree with these statements about the advanced mathematics/physics you are studying?

Fill in one oval only.

~~**SQ21c (FT) I am studying advanced mathematics/physics because my friends are studying this subject**~~

~~**SQ21f (FT) It is important for me to show that I am better in advanced mathematics/physics than other students**~~

~~**SQ21g (FT) I am studying advanced mathematics/physics because a teacher advised me to take this subject**~~

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

4. Removed response categories used in the Field Test:

SQ32 (FT&MS)- What do you think about your school? Tell how much you agree with these statements.

Fill in one oval for each row.

SQP32e — ~~I like to go to school to see my friends~~

SQP32g — ~~My teachers respect my ideas~~

With response options:

1. Agree a lot
2. Agree a little
3. Disagree a little
4. Disagree a lot

5. Added a new question for the Main Study:

SQ34 (MS) - During this school year, did you participate in any of these extracurricular activities?

Fill in ovals for all that apply

1. Sports
2. Performing arts
3. Academic clubs
4. Vocational/professional clubs
5. Honor societies
6. Publications
7. Student government
8. Service clubs
9. Hobby clubs