



eTIMSS

The Future of TIMSS

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Executive Directors

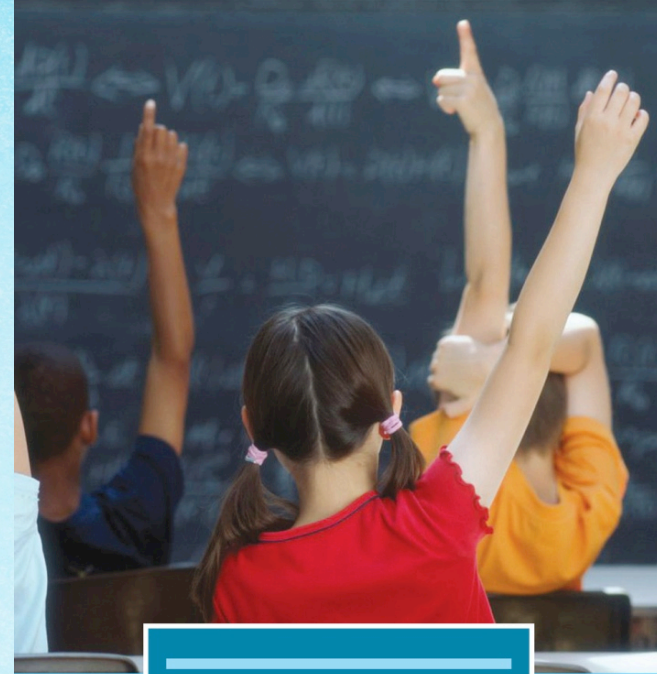
TIMSS & PIRLS International Study Center
Boston College

56th IEA General Assembly
October 2015, Mexico City



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Announcing
TIMSS 2019
eTIMSS 2019



TIMSS
2019

**Trends in
International
Mathematics and
Science Study**

Ensuring Every Child Counts

TIMSS
2019

eAssessment the Future of Assessment

- Improve measurement
 - Assess complex areas of the framework that are difficult to measure (complex tasks)
 - More engaging assessment can improve motivation
- Increase Operational Efficiency
 - Item development
 - Translation
 - Printing and shipping
 - Data entry and scoring



Developing eTIMSS 2019

TIMSS has twin goals:

- Maintaining continuity to measure trends
 - PaperTIMSS links to the past
- Innovations to be relevant and take advantage of new technologies
 - eTIMSS links to the future



Good Progress on eTIMSS During Past Year

- Converted trend items to tablet-and-stylus format
 - 2011 and 2015 items that will be in TIMSS 2019
- 4th grade – 16 item blocks (8 math, 8 science)
 - 200 items
- 8th grade – 16 item blocks (8 math, 8 science)
 - 250 items
- Covering a variety of item formats

Choice of Assessment Platform

- Items converted to the vertical screen layout on a tablet that can be used with a stylus
 - Samsung Galaxy Tab
- Idea to replicate the current TIMSS response experience
 - Multiple choice items
 - Constructed response items
 - Drawing graphs and diagrams
 - Showing computations

Adapting PaperTIMSS Items to eTIMSS Format

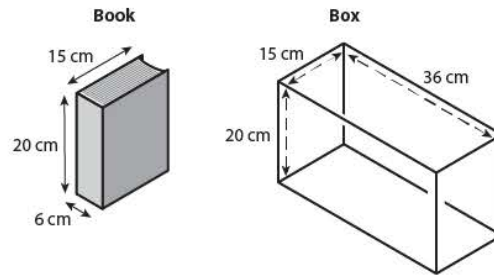
- Essentially identical $\approx 80\%$
 - Looks the same on tablet as on paper
- Readily adaptable $\approx 20\%$
 - Slight modifications to fit smaller space (rearranging, reducing size of graphics, or use scrolling)
- Too big for tablet – only 5 items at 8th grade
 - Two page items, require scrolling

Essentially Identical



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Ryan is packing books into a rectangular box.
All the books are the same size.



How many books will fill the box?

Answer: _____

M01533

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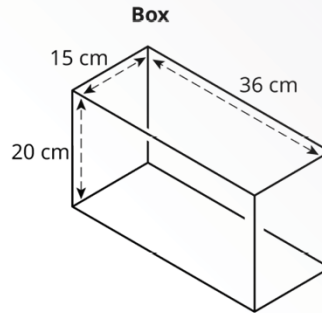
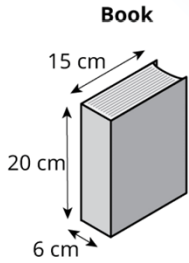
21

22

23

24

2 Ryan is packing books into a rectangular box.
All the books are the same size.



How many books will fill the box?

Answer: _____



BACK

NEXT



Readily Adaptable



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One evening Peter went outside and made a drawing of a house, a tree, and the Moon. About 2 weeks later, Peter's brother, John, went outside and made a drawing of the same house, the same tree, and the Moon.

When they compared their drawings, they saw that they drew the Moon differently.



Peter's Drawing

John's Drawing

Whose drawing of the moon is correct?

(Check one box.)

- Only Peter's drawing of the moon can be correct.
- Only John's drawing of the moon can be correct.
- Both drawings of the moon can be correct.

Explain your answer.

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4 One evening Peter went outside and made a drawing of a house, a tree, and the Moon. About 2 weeks later, Peter's brother, John, went outside and made a drawing of the same house, the same tree, and the Moon. When they compared their drawings, they saw that they drew the Moon differently.



Whose drawing of the moon is correct?

(Check one box.)

Only Peter's drawing.

Only John's drawing.

Both drawings.

Explain your answer.



BACK

NEXT

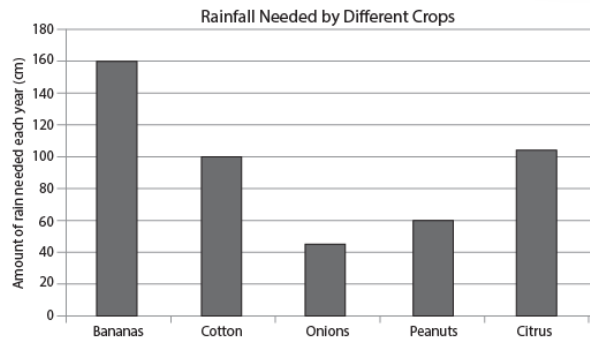


Too Big for Tablet



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The amount of rainfall needed by different crops is shown in the graph below.

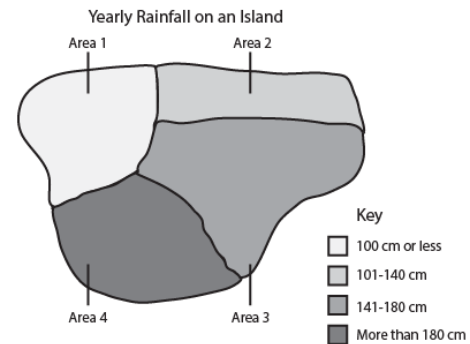


A. A farmer wants to plant crops in an area that gets about 60 cm of rain each year. Which crops will probably grow best in this area?

- (A) onions only
- (B) onions and peanuts
- (C) cotton and citrus
- (D) bananas, citrus, and cotton

S061115_1

B. Another farmer lives on a tropical island in the ocean and wants to plant bananas. A diagram of the island is shown below.



Based on the diagram of the island and the information in the graph in part (A), in which area should the farmer plant bananas?

- (A) Area 1
- (B) Area 2
- (C) Area 3
- (D) Area 4

S061115_2

eTIMSS Item Builder

- Developed jointly by IEA DPC and TIMSS & PIRLS International Study Center
- Used to convert items to tablet format
- Entered components of items into Item Builder database
- Exported items to eTIMSS Player for testing and cognitive interviews

Cognitive Interviews

August-September 2015

16 students – 8 at each grade

- Feasibility of scrolling
 - Students comfortable with scrolling
- Feasibility of writing with a stylus
 - About half the students at each grade found it “not so easy” (“cumbersome”, “frustrating”, “not enough space”)
 - Said they wrote less than they would have on paper

Prepilot eTIMSS System

- TIMSS will update the tablet-and-stylus approach to facilitate students answering constructed-response items – add keyboard function
- Pilot eTIMSS Player system in 2016 with subset of TIMSS 2019 trend blocks
 - 1 booklet equivalent, half math and half science
 - 2-3 countries, 3 classes (English speaking) per grade
 - 4th and 8th grades

Developing Prototype Problem Solving and Inquiry Tasks (PSIs)

- Simulate real world/laboratory situations
 - Problem solving in mathematics
 - Inquiry in science
- Involves integrating and applying process skills and content knowledge
- More adaptive/responsive way of presenting students with items based on a series of steps
- More engaging, interactive, and visually attractive

PSI Tasks Very Difficult to Develop

- January-September
- Two teams of consultants (math and science)
- Drafted 10 PSI tasks based on scenarios and simulations
 - 6 in mathematics, 4 in science
 - One complete functioning prototype
 - Five partially designed tasks
 - Four tasks in initial review

Farm CSI – Crime Scene Investigator

- 4th grade science
- Assesses classification and inquiry skills
- Begins with the “scene of the crime”
- Conducts a systematic investigation of the suspects

Robots

- 4th grade mathematics
- Assesses foundational understanding of functions
- Students choose a robot to help them solve mathematics problems
- The robot uses different rules for different problems

Pepper Plants

- 8th grade science
- Design an experiment to see which fertilizer results in most productive pepper plants
- Simulates doing the experiment in a classroom setting
- Students are given 3 tanks of seedlings
- Shows how plants would have looked after six weeks, based on student's design

Designing a Building

- 8th grade mathematics
- Assesses measurement and geometry
- Students decide what size an equipment building should be and design the building components accordingly
- Calculate area of floor according to design
- Add a pitched roof so that rain can run off
- Paint the walls – area and cost of paint
- Design water tank to fit under roof
 - Relationships among height, diameter, and volume

Challenges

- Very time-consuming to construct, requiring many iterations of review and piloting
- Very expensive
 - Assessment experts
 - Visual artists and graphic specialists
 - Front-end developers and programmers
- Understanding the most effective ways to capitalize on digital environment

Goals for eTIMSS in 2019

- As many countries as possible should participate in eTIMSS
- Provide countries a path to becoming computerized in 2019
- All development of new items for 2019 will be based on updated *TIMSS 2019 Assessment Framework*
 - Current frameworks include comprehensive coverage of problem solving and inquiry
 - Recognize benefits of computer based assessment



Goals for eTIMSS in 2019 (cont.)

- Development of new items targeted on replacing released items in accordance with updated 2019 framework
 - Detailed specifications: content topic, cognitive process, type of item (MC, CR, extended scenario PSIs)
 - Framework weights determine number required
- eTIMSS has 8 converted trend blocks and 6 new blocks of digitally enhanced items, including PSIs
- PaperTIMSS has 8 trend blocks and 6 newly developed blocks – as usual
 - Developed in parallel

eTIMSS Pilot in 2017

- Collect data about newly-developed PSIs and shorter-items types that capitalize on digital approach
- Collect data on converted trend items
 - Compare results to paper-and-pencil results, indication of mode effect
- Try translation, delivery, and scoring systems
- 6 or more partner countries
 - 2 booklets of PSI blocks per grade (4 math, 4 science) \approx 400 students
 - 2 booklets of trend blocks per grade (6 math, 6 science) on tablet and paper \approx 400 students

Field Test in 2018

- For countries planning to remain PaperTIMSS countries, field test will be similar to past TIMSS field tests
 - Field test twice as many items/blocks as will be needed for 2019 – 12 blocks at each grade because need 6 new blocks
- Countries converting to eTIMSS **also** will field test the newly developed digitally enhanced items
 - Also twice as many as will be needed

TIMSS 2019

- eTIMSS countries also administer PaperTIMSS
 - Counterbalanced design – same students
 - Get enhanced TIMSS achievement estimate, based on both eTIMSS and PaperTIMSS
 - Can convert to only eTIMSS in next 2023 cycle
 - PaperTIMSS provides insurance for trend
- PaperTIMSS countries as usual

Benefits of Moving to eTIMSS

- Enhanced assessment – provides extended coverage of framework
- Take advantage of efficiencies provided by IEA eAssessment system
 - Online translation and verification, automatic data entry, online scoring
- Keep pace with students' experiences in and out of school
- Special report of students' performance on PSIs

Need a Critical Mass of Countries for eTIMSS

- Big investment – need many countries to make effort worthwhile
- Tipping point – need many countries for TIMSS to become eTIMSS and keep assessment current

Sign Up Now!!





Thank You!

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