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# PISA: What It Measures, Why It Matters



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# What Is PISA?

- Assessment of students from 65 nations that make up 90 percent of world's economy
- Administered by OECD
- Given every three years



# What Is PISA?

Differs from other international studies

- Given to fifteen-year-olds
- Reading, mathematics, and science
- In 2009, pilot administration on computer
- Measures students' abilities to apply knowledge to real-world problems



# An Example

For health reasons people should limit their efforts, for instance during sports, in order not to exceed a certain heartbeat frequency. For years the relationship between a person's recommended maximum heart rate and the person's age was described by the following formula: *Recommended maximum heart rate* =  $220 - \text{age}$  Recent research showed that this formula should be modified slightly. The new formula is as follows: *Recommended maximum heart rate* =  $208 - (0.7 \times \text{age})$ .

- **Question 46.1**
- A newspaper article stated, “A result of using the new formula instead of the old one is that the recommended maximum number of heartbeats per minute for young people decreases slightly and for old people it increases slightly.” From which age onward does the recommended maximum heart rate increase as a result of the introduction of the new formula? Show your work.
- **Question 46.2**
- The formula *recommended maximum heart rate* =  $208 - (0.7 \times \text{age})$  is also used to determine when physical training is most effective. Research has shown that physical training is most effective when the heartbeat is at 80 percent of the recommended maximum heart rate. Write down a formula for calculating the heart rate for most effective physical training, expressed in terms of age.



# How Do U.S. Students Do?

- In mathematics, 32<sup>nd</sup>
  - 1 percent at top level
- In science, 23<sup>rd</sup>
  - 9 percent at top two levels
- In reading, 12<sup>th</sup> (2003)



# Mathematics, 2006

- OECD average 498
- Finland 548
- Korea, Republic of 547
- Netherlands 531
- Switzerland 530
- Canada 527
- Japan 523
- New Zealand 522
- Belgium 520
- Australia 520
- Denmark 513
- Czech Republic 510
- Iceland 506
- Austria 505
- Germany 504
- Sweden 502
- Ireland 501
- France 496
- United Kingdom 495
- Poland 495
- Slovak Republic 492
- Hungary 491
- Luxembourg 490
- Norway 490
- Spain 480
- **United States 474**
- Portugal 466
- Italy 462
- Greece 459
- Turkey 424
- Mexico 406

# Why PISA Matters

It matters for students

- Canadian study followed 30,000 students
- Performance on PISA strongly associated with educational attainment
  - Students in bottom quartile more likely to drop out of school
  - Students in top quartile more likely to be in education at age twenty-one
- Students at Level 5 in reading were *twenty times* more likely to go to university than students in Level 1



# Why PISA Matters

It matters for countries

- Raising average PISA score by 25 points would add \$41 trillion to U.S. GDP by 2090
- Raising average PISA score to Finland's level would add \$103 trillion to U.S. GDP by 2090
- Bringing all students to Level 2 would add \$72 trillion to U.S. GDP by 2090

