Annex E

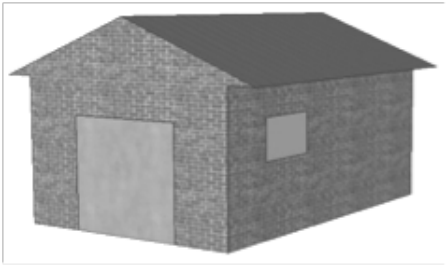
Sample of PISA questions requiring Level 1 skills

The following sample questions from the Programme for International Student Assessment (PISA) test illustrate the skills required for 15-year-olds to perform at Level 1 proficiency. A variety of additional sample questions at different levels for the PISA assessments can be found in *PISA 2012 Results: What Students Know and Can Do (Volume I, Revised edition, February 2014): Student Performance in Mathematics, Reading and Science* (2014, OECD Publishing, Paris).

(1) Garage (Mathematics, PISA 2012)

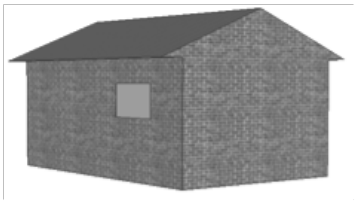
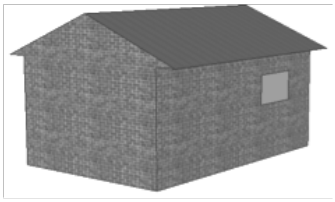
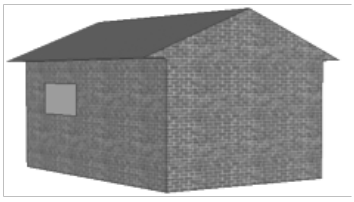
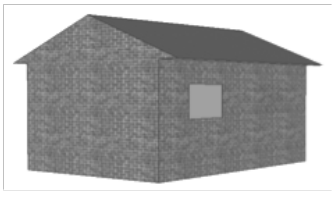
A garage manufacturer's "basic" range includes models with just one window and one door.

George chooses the following model from the "basic" range. The position of the window and the door are shown here.



Question 1: The illustrations below show different "basic" models as viewed from the back. Only one of these illustrations matches the model above chosen by George.

Which model did George choose? Circle A, B, C or D.

A	B
	
C	**D**
	

Scoring:

Question intent:

Description: Use space ability to identify a 3D view corresponding to another given 3D view

Mathematical content area: Space and shape

Context: Occupational

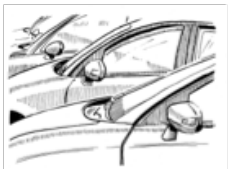
Process: Interpret

Full Credit: C [Graphic C]. No Credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 420 score points on the PISA mathematics scale. Across OECD countries, 65% of students answered correctly.

Comment: Question 1 lies very close to the Level 1/Level 2 boundary on the proficiency scale. It asks students to identify a picture of a building from the back, given the view from the front. The diagrams must be interpreted in relation to the real-world positioning of "from the back", so this question is classified in the interpreting process. The correct response is C. Mental rotation tasks such as this are solved by some people using intuitive spatial visualisation. Other people need explicit reasoning processes. They may analyse the relative positions of multiple features (door, window, nearest corner), discounting the multiple choice alternatives one by one. Others might draw a bird's-eye view, and then physically rotate it. This is just one example of how different students may use quite different methods to solve PISA questions. In this case, explicit reasoning for some students is intuitive for others.

(2) Which Car? (Mathematics, PISA 2012)



Chris has just received her car driving licence and wants to buy her first car.

This table below shows the details of four cars she finds at a local car dealer.

Model:	Alpha	Bolte	Castel	Dezal
Year	2003	2000	2001	1999
Advertised price (zeds)	4800	4450	4250	3990
Distance travelled (kilometres)	105 000	115 000	128 000	109 000
Engine capacity (litres)	1.79	1.796	1.82	1.783

(In each country, the car's names were changed to other more suitable fictional names if necessary.)

Question 1: Chris wants a car that meets **all** of these conditions:

- The distance travelled is **not** higher than 120 000 kilometres.
- It was made in the year 2000 or a later year.
- The advertised price is **not** higher than 4500 zeds.

Which car meets Chris's conditions?

A. Alpha

B. Bolte

C. Castel

D. Dezal

Scoring:

Question intent:

Description: Select a value that meets four numerical conditions/statements set within a financial context

Mathematical content area: Uncertainty and data

Context: Personal

Process: Interpret

Full Credit: B Bolte. No Credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 328 score points on the PISA mathematics scale. Across OECD countries, 81% of students answered correctly.

(3) Exchange Rate (Mathematics, PISA 2003)

Mei-Ling from Singapore was preparing to go to South Africa for 3 months as an exchange student. She needed to change some Singapore dollars (SGD) into South African rand (ZAR).

Question 1: Mei-Ling found out that the exchange rate between Singapore dollars and South African rand was:

1 SGD = 4.2 ZAR

Mei-Ling changed 3 000 Singapore dollars into South African rand at this exchange rate.

How much money in South African rand did Mei-Ling get?

Answer: .....

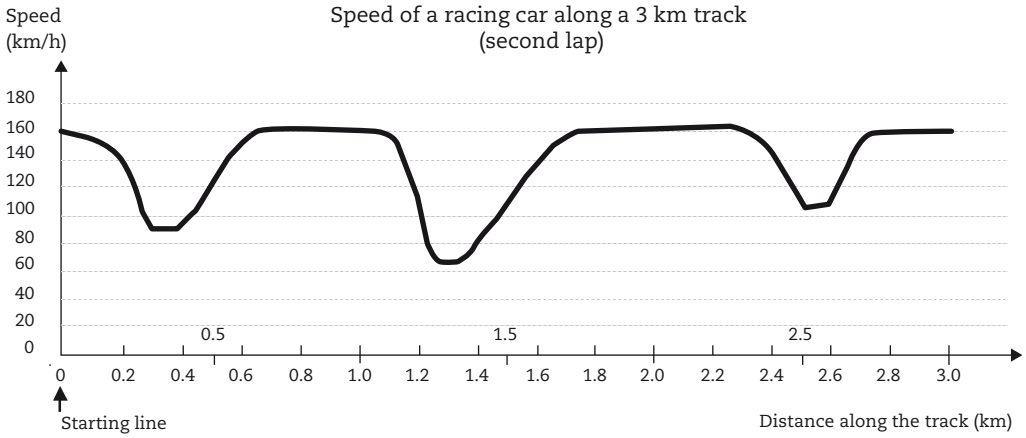
Scoring:

Full Credit: 12 600 ZAR (unit not required). No Credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 406 score points on the PISA mathematics scale. Across OECD countries, 80% of students answered correctly. To answer the question correctly students have to draw on skills from the reproduction competency cluster.

(4) Speed of Racing Car (Mathematics, PISA 2000)

This graph shows how the speed of a racing car varies along a flat 3 kilometre track during its second lap.



Question 2: Where was the lowest speed recorded during the second lap?

A. at the starting line.

B. at about 0.8 km.

C. at about 1.3 km.

D. halfway around the track.

Question 3: What can you say about the speed of the car between the 2.6 km and 2.8 km marks?

A. The speed of the car remains constant.

B. The speed of the car is increasing.

C. The speed of the car is decreasing.

D. The speed of the car cannot be determined from the graph.

Scoring:

Q2. Full Credit: C. at about 1.3 km. No Credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 403 score points on the PISA mathematics scale. Across OECD countries, 84% of students answered correctly. To answer the question correctly students have to draw on skills from the reproduction competency cluster.

Q3. Full credit: B. The speed of the car is increasing. No credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 413 score points on the PISA mathematics scale. Across OECD countries, 83% of students answered correctly. To answer the question correctly students have to draw on skills from the reproduction competency cluster.

(5) Physical Exercise (Science, PISA 2006)

Regular but moderate physical exercise is good for our health.

Question 2: What happens when muscles are exercised? Circle "Yes" or "No" for each statement.

Does this happen when muscles are exercised?	**Yes or No?**
Muscles get an increased flow of blood	Yes / No
Fats are formed in the muscles	Yes / No

Scoring:

Full Credit: Yes, No in that order. No credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 386 score points on the PISA 2006 science scale. Across OECD countries, 82.4% of students answered correctly. This question assesses students' competency of explaining phenomena scientifically.

(6) Clothes (Science, PISA 2006)

Read the text and answer the questions that follow.

A team of British scientists is developing "intelligent" clothes that will give disabled children the power of "speech". Children wearing waistcoats made of a unique electrotextile, linked to a speech synthesizer, will be able to make themselves understood simply by tapping on the touch-sensitive material.

The material is made up of normal cloth and an ingenious mesh of carbon-impregnated fibers that can conduct electricity. When pressure is applied to the fabric, the pattern of signals that passes through the conducting fibers is altered and a computer chip can work out where the cloth has been touched. It then can trigger whatever electronic device is attached to it, which could be no bigger than two boxes of matches.

"The smart bit is in how we weave the fabric and how we send signals through it – and we can weave it into existing fabric designs so you cannot see it's in there," says one of the scientists.

Without being damaged, the material can be washed, wrapped around objects or scrunched up. The scientist also claims it can be mass-produced cheaply.

Source: Steve Farrer, "Interactive fabric promises a material gift of the garb", *The Australian*, 10 August 1998.

Question 2: Which piece of laboratory equipment would be among the equipment you would need to check that the fabric is conducting electricity?

A. Voltmeter

B. Light box

C. Micrometer

D. Sound meter

Scoring:

Full Credit: A. Voltmeter. No credit: Other responses and missing.

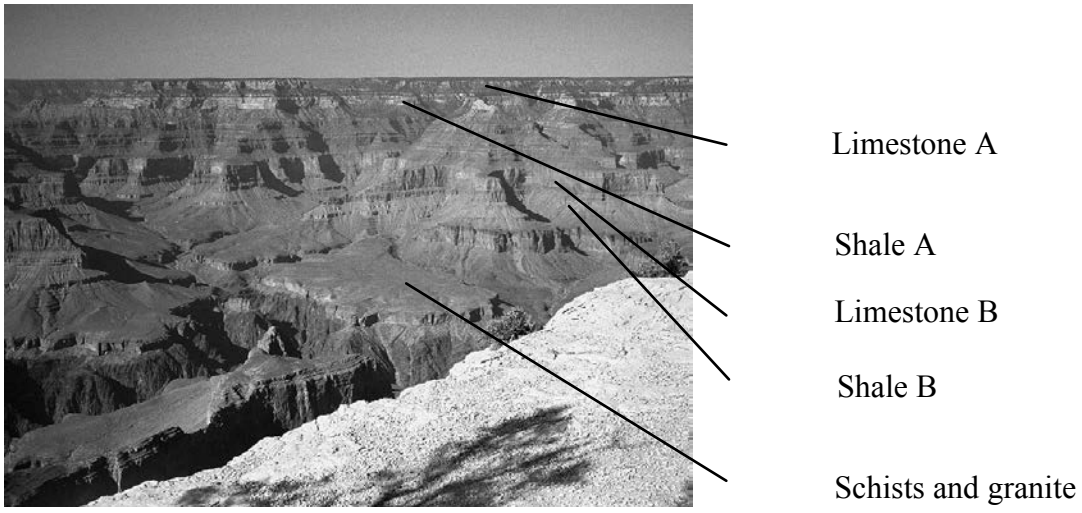
Answering this question correctly corresponds to a difficulty of 399 score points on the PISA 2006 science scale. Across OECD countries, 79.4% of students answered correctly.

The question only requires the student to associate electric current with a device used in electric circuits, i.e. the recall of a simple scientific fact. The competency necessary to answer this question is explaining phenomena scientifically.

(7) The Grand Canyon (Science, PISA 2006)

The Grand Canyon is located in a desert in the USA. It is a very large and deep canyon containing many layers of rock. Sometime in the past, movements in the Earth's crust lifted these layers up. The Grand Canyon is now 1.6 km deep in parts. The Colorado River runs through the bottom of the canyon.

See the picture below of the Grand Canyon taken from its south rim. Several different layers of rock can be seen in the walls of the canyon.



Question 2: There are many fossils of marine animals, such as clams, fish and corals, in the Limestone A layer of the Grand Canyon. What happened millions of years ago that explains why such fossils are found there?

A. In ancient times, people brought seafood to the area from the ocean.

B. Oceans were once much rougher and sea life washed inland on giant waves.

C. An ocean covered this area at that time and then receded later.

D. Some sea animals once lived on land before migrating to the sea.

Scoring:

Full Credit: C. No credit: Other responses and missing.

Answering this question correctly corresponds to a difficulty of 411 score points on the PISA 2006 science scale. Across OECD countries, 75.8% of students answered correctly. The question was categorised as part of the competency explaining phenomena scientifically.