

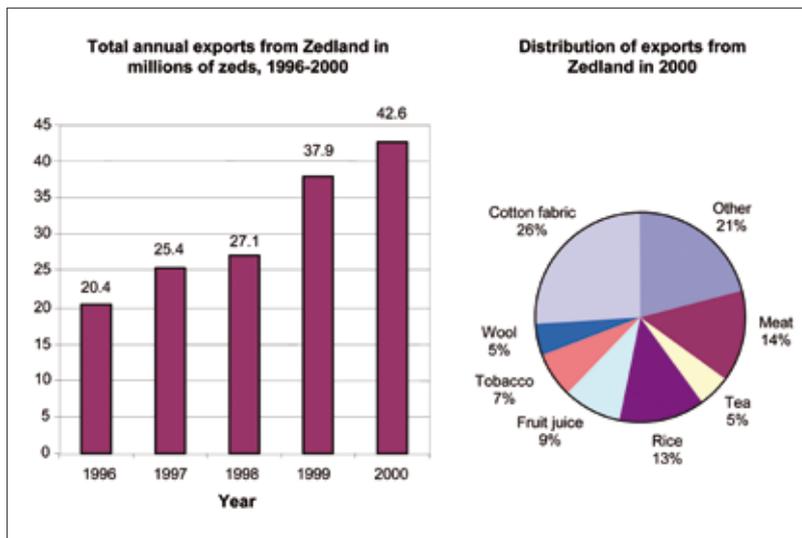
contexts within his actual experience. Thus, an effective use of technical terminology and a developed skill in describing and comparing data are required.

PISA splits the cognitive mathematical **competencies** into three clusters, below stated in degree of relevance:

1. **REPRODUCTION**: it is the first step, involving the **knowledge** of common problem representations, familiar objects, routine procedures,...
2. **CONNECTIONS**: deals with applying problem solving to contexts other than routine, but still involving familiar settings.
3. **REFLECTION**: relates to the **abilities** to plan original solution strategies and implement them also when dealing with unfamiliar problems.

Trying to put the debate about the performance of Italian students aside, we would like to examine two released items of last editions of PISA survey in UK, involving data presentation and graphs reading. Namely: EXPORTS (PISA 2003) and ROBBERIES (PISA 2000).

[TAKE THE TEST]



In the above picture, there are two different graphs: a **bar graph** and a **pie chart**. The first one is employed to describe trends and represents the amount of exports from Zedland referred to the years from 1996 to 2000. When reading the graph, a variety of specific terms are used: the value of exports seems to **range** between 20.4 and 42.6 millions of zeds; the exports **have risen sharply** between 1998 and 1999 and **reached a peak** in 2000. The exports, instead, **have risen steadily** between 1996 and 1998. The values are expressed in millions (10^6) zeds, that is, in 1996 Zedland exported $20.4 \text{ million zeds} = 20.4 \cdot 10^6 \text{ zeds} = 20\,400\,000 \text{ zeds}$.

Once found the key to graph reading, answering the official PISA question is not so difficult:

QUESTION 1: EXPORTS

What was the total value (in millions of zeds) of export from Zedland in 1998?

Answer:

Don't be surprised if this test was so simple: it was actually included in the first level competency cluster (REPRODUCTION): students are just requested to report the value above the third vertical bar. Now let's try something different: the next question lays in the second level competency cluster (CONNECTIONS), that is, it is just a little harder.

QUESTION 2: EXPORTS

What was the value of fruit juice exported from Zedland in 2000?

- 1.8 million zeds.
- 2.3 million zeds.
- 2.4 million zeds.
- 3.4 million zeds.
- 3.8 million zeds.

Now we move on to the second graph, a **pie chart**, showing the relationship of parts to a whole: since the question asks about fruit juice, we refer to the data in the bottom-left cyan label and say that the fruit juice **accounts for** 9% of the total amount.

This value is in percentage, so we need to relate it to a fixed value, in order to express it in millions of zeds. Notice that we do not have to use the value of the previous answer (exports in 1998), because the pie chart refers to exports in 2000. In other words (and in other numbers!) we are asked to calculate the 9% out of 42.6 million zeds (label above the last bar on the first graph):

$$\begin{aligned} \text{Fruit juice in 2000} &= 9\% \text{ of } 42.6 = 9/100 \cdot 42.6 = \\ &= 3.834 \text{ mln zeds.} \end{aligned}$$

Then, approximating to the first decimal digit, we conclude that the correct answer is E.

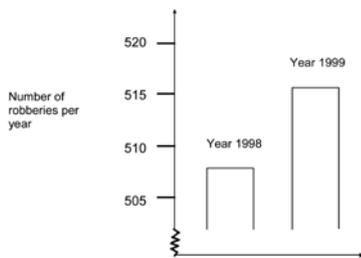
[TRY YOURSELF]

And here's to you a final test, which requires the highest competence level (REFLECTIONS): after reading the graph, you are asked to give reasons for your point.

ROBBERIES

QUESTION 1: ROBBERIES

A TV reporter showed this graph and said: "The graph shows that there is a huge increase in the number of robberies from 1998 to 1999".



Do you consider the reporter's statement to be a reasonable interpretation of the graph? Give an explanation to support your answer.

[GLOSSARY]

- Literacy** : ability to go beyond knowledge and skills, so as to master any challenge in real life (ITA: padronanza dei concetti di base, competenza funzionale)
- Skill** : training-based ability (ITA: abilità, qualificazione, bravura)
- Competency / Competence** : knowing "how to" do something (ITA: competenza, abilità, capacità)
- Knowledge** : "taking" from anything around, so as to have the right "tools" to explore the world (ITA: conoscenza, sapere, essere informato)
- Ability** : it's what someone can actually do, not necessarily as a result of a training (ITA: capacità, talento, attitudine)

Modi di tradurre "COMPETENZA"

6. Bar graph : is used to present and compare data, it consists of rectangular bars that differ in height (or length, if horizontal) according to the value or frequency they represent

7. Pie chart : is a circle divided into "slices" which reflect the proportion of the variables in relation to the whole, that in percentage is equal to 100%

[THE FINAL PUN]

Which is the real OECD PISA Headquarters building?



Above, from the top: Château de la Muette; Alessio Facchin // Creative Commons License.

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