Scientific Literacy

- ✓ **Have the scientific knowledge & skills needed for everyday life**
- ✓ **Able to use the key ideas in science to make informed decisions & participate in society**

PISA assesses the ability to use processes & knowledge rather than to recall correct information

Items based on real-life situations

How is scientific literacy measured?

Ability to

- use scientific knowledge
- recognise scientific questions
- identify evidence
- draw/evaluate conclusions
- communicate ideas

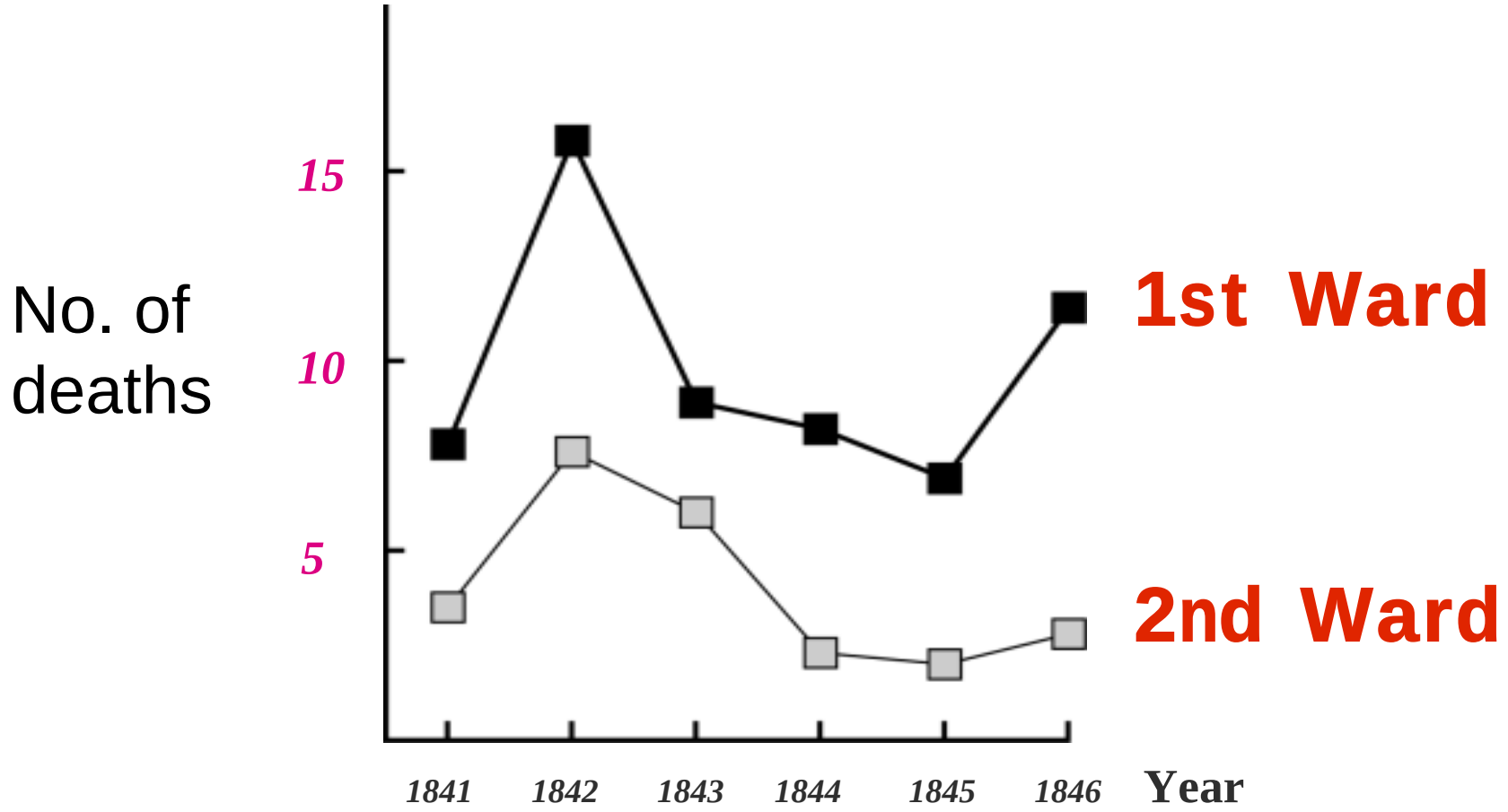
Semmelweis' diary I

July 1846

Next week I'll become a doctor at the First Ward of the maternity clinic of the Vienna General Hospital.

I was frightened when I heard about the % of patients who die in this clinic.

This month 36 of 208 mothers die there, all from puerperal fever [産褥熱].


No. of deaths
15
10
5
1st Ward
2nd Ward
1841
1842
1843
1844
1845
1846
Year

Why do so many women die from this fever after giving birth without any problems?

Scientists' belief:

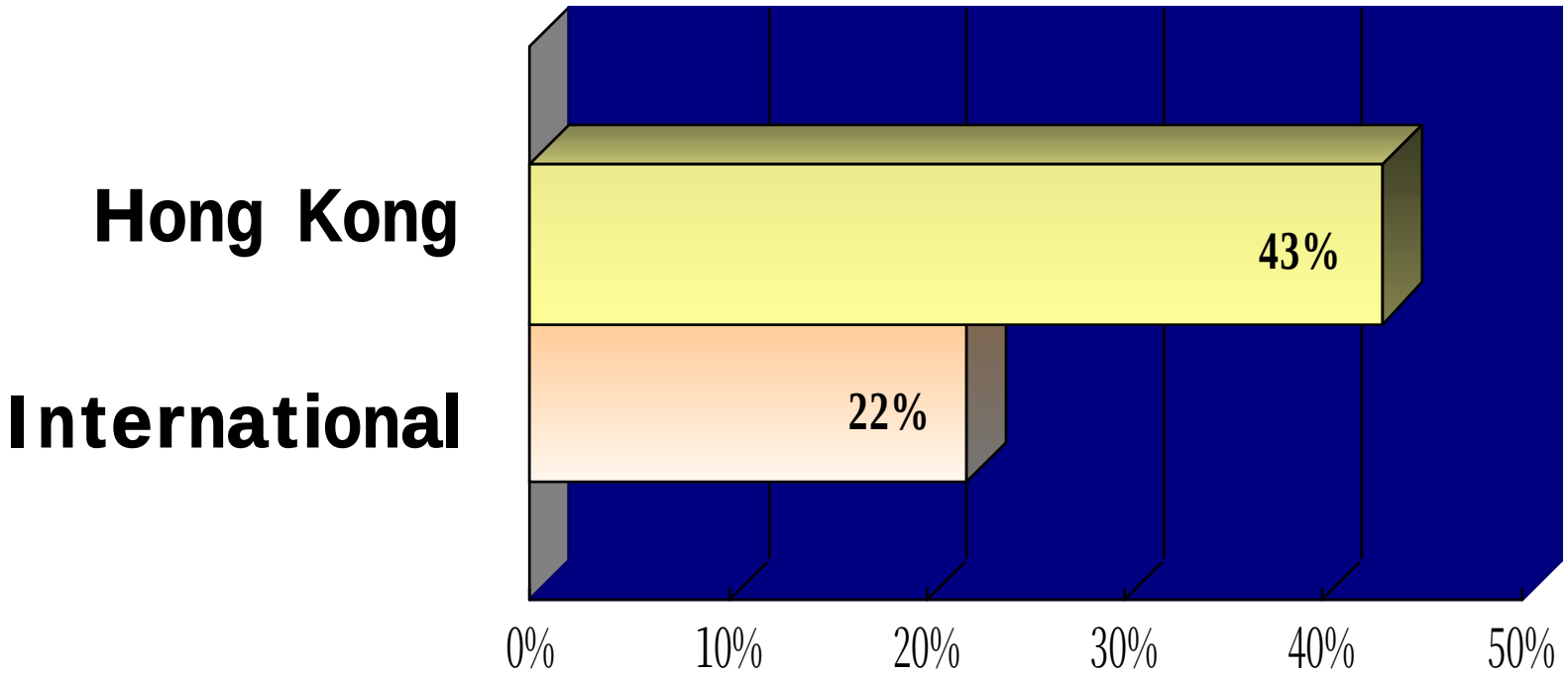
- **Changes in the air**
- **Extraterrestrial influence**
- **Movement of the Earth, e.g. earthquake**

Semm tried to use the data he collected to persuade his colleagues that the fever was not likely to be caused by these factors.

Drawing/evaluating conclusions

If you were Semm, give a reason **why the fever is unlikely to be caused by earthquake**.

Drawing conclusions



Semmelweis' diary II

In the hospital, dead bodies are cut open to find the cause of death.

Semm recorded that doctors in 1st Ward usually took part in dissection on dead women, before they examined women who had just given birth.

They did not clean themselves after the dissections. One of Semm's friend died after having cut himself during such a dissection. He showed the symptoms of puerperal fever.

This gave Semm a new idea.

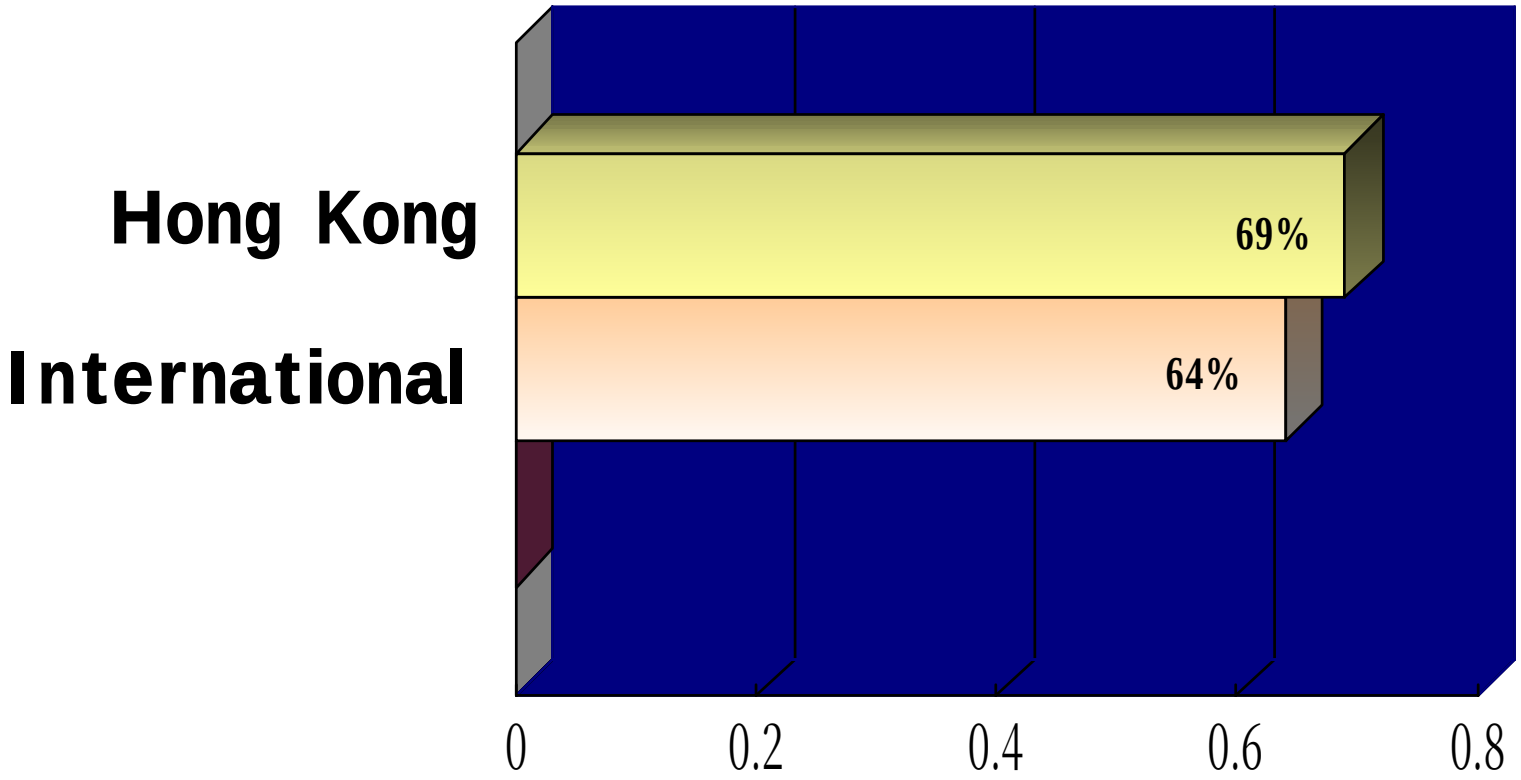
His idea had to do with the high % of women dying in the ward and the doctors' behaviour.

Recognising questions

What was this idea?

- Cleaning after dissection lead to decrease of fever.
- Doctors should not do dissection because they may cut themselves.
- Students smell because they do not clean themselves after dissection.
- Students want to show that they are industrious …

Recognising questions



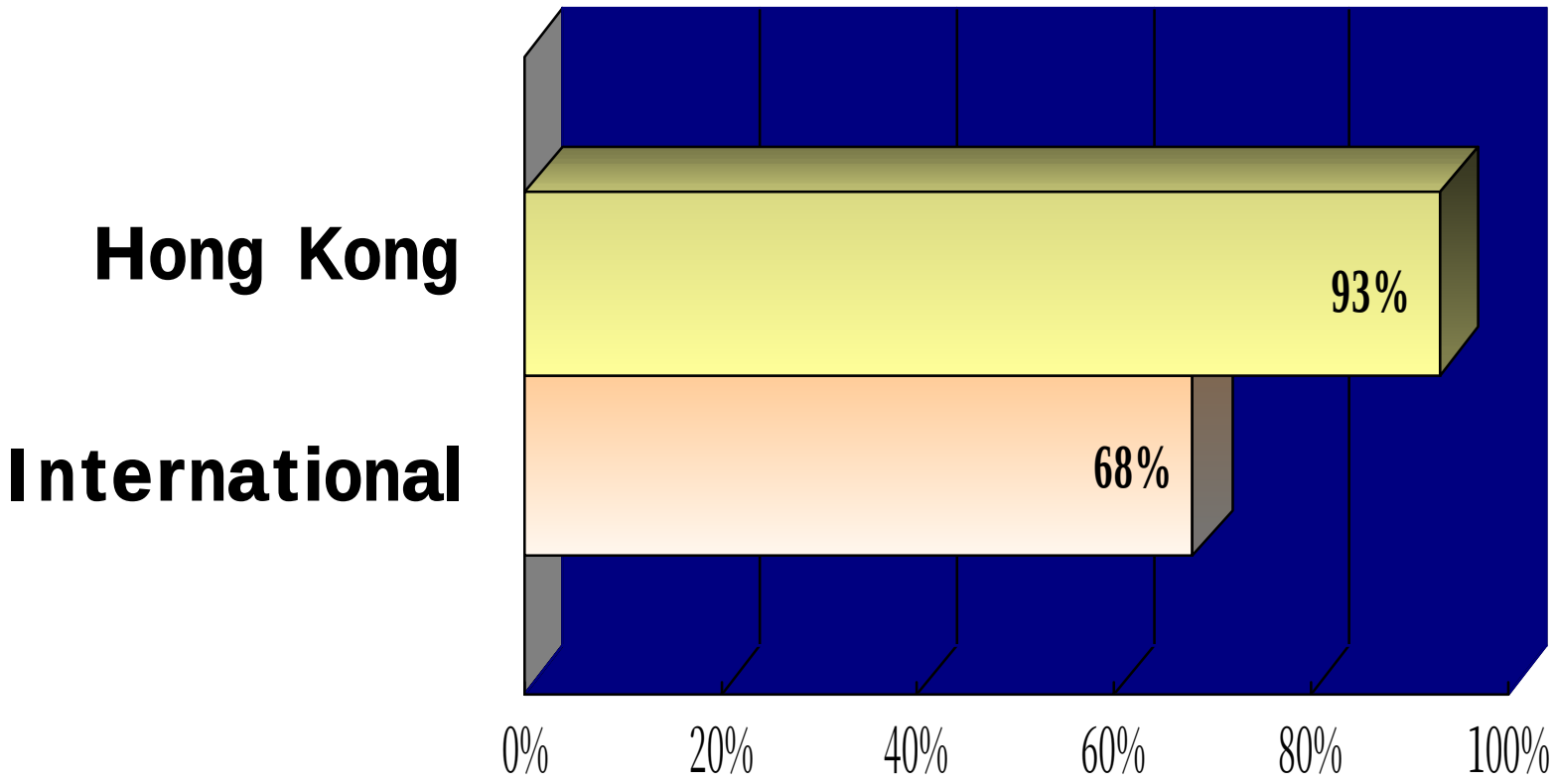
Fevers are difficult to cure and are still a problem in hospitals.

Among these measures are washing sheets at high temperatures.

Explain why high temperatures help to reduce the risk that patients will contract a fever.

Demonstrate understanding of scientific knowledge

Understanding scientific knowledge



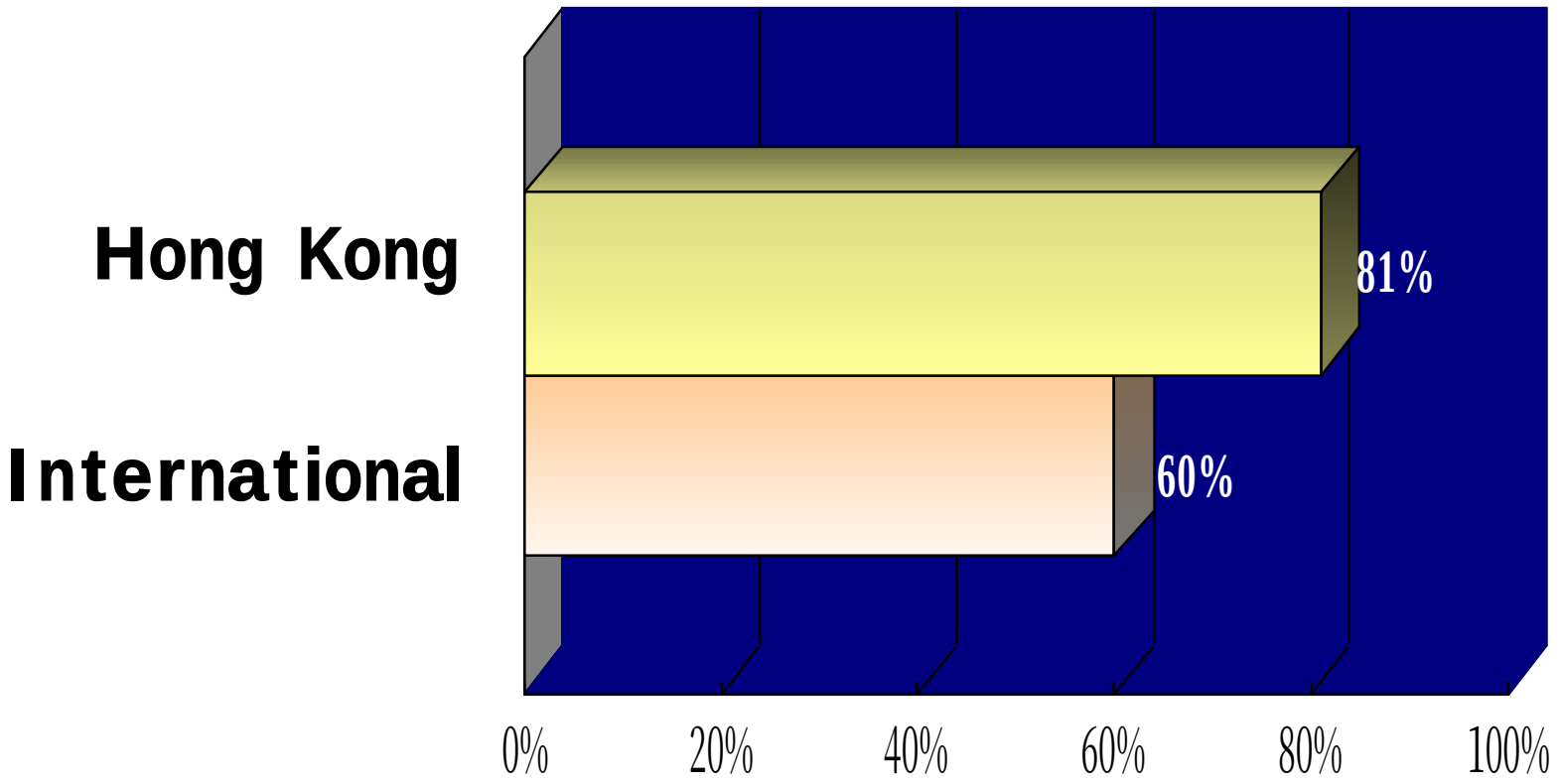
Many diseases may be cured by using antibiotics. However, the success of some antibiotics against puerperal fever has dropped in recent years.

What is the reason for this?

- Once produced, antibiotics gradually lose their activity.
- Bacteria become resistant to antibiotics.
- These antibiotics only help against puerperal fever, but not against other diseases.
- The need for these antibiotics has been reduced because public health conditions have improved.

Demonstrate understanding of scientific knowledge

Understanding scientific knowledge



Drawing conclusions [Earthquake as the cause?]	**47 %**
Recognising questions [What was Semm's idea?]	**69 %**
Understanding scientific knowledge [high temperature]	**93 %**
Understanding scientific knowledge [antibiotics]	**81 %**

Themes used in PISA study:

- Greenhouse effect
- Cloning
- Day length
- Tidal energy
- Water pollution
- Ozone

How is scientific literacy measured?

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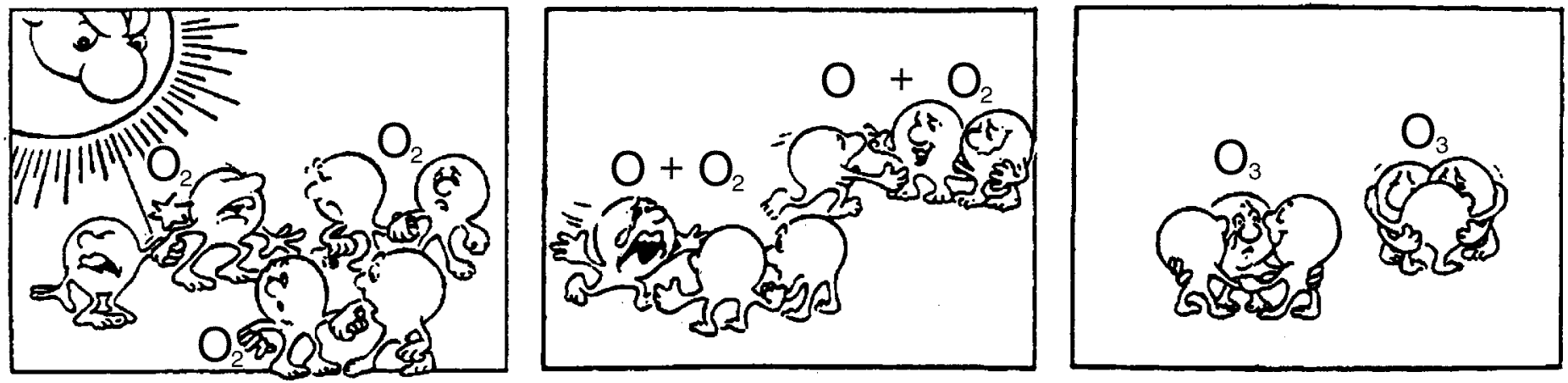
Communicating ideas



Assume that your uncle knows:

O is the symbol for oxygen

what atoms and molecules are

Write an explanation of the comic strip for your uncle.

Using scientific knowledge

Without this beneficial ozone layer, humans would be more susceptible to certain diseases due to the increased incidence of ultra-violet rays from the Sun.

Name one of these specific diseases.

Recognising questions

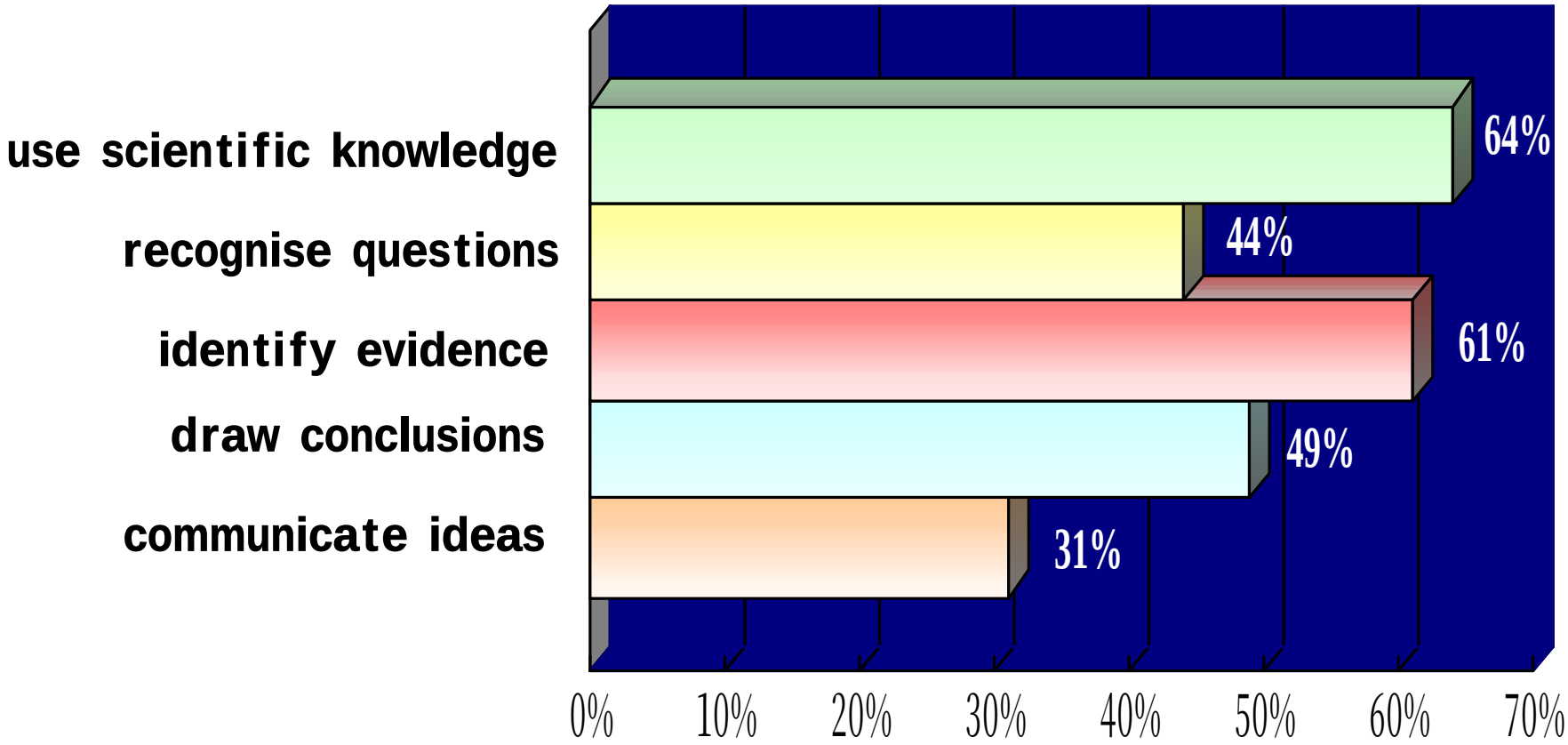
Can the questions listed below be answered by scientific research?

Recognising questions

Should the scientific uncertainties about the influence of CFCs on the ozone layer be a reason for governments to take no action?

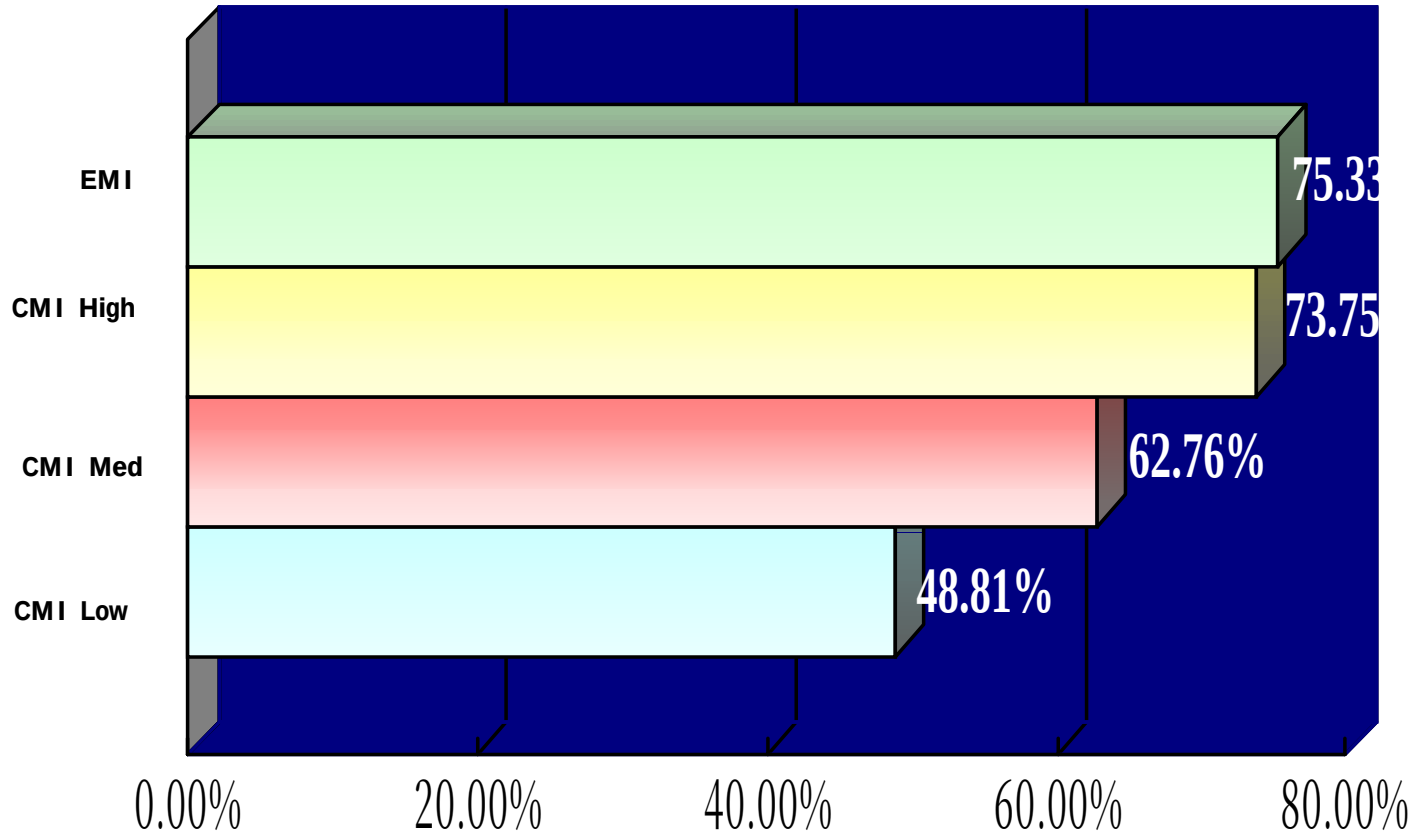
What would the concentration of CFCs be in the atmosphere in the year 2002 … ?

Overall performance in different abilities

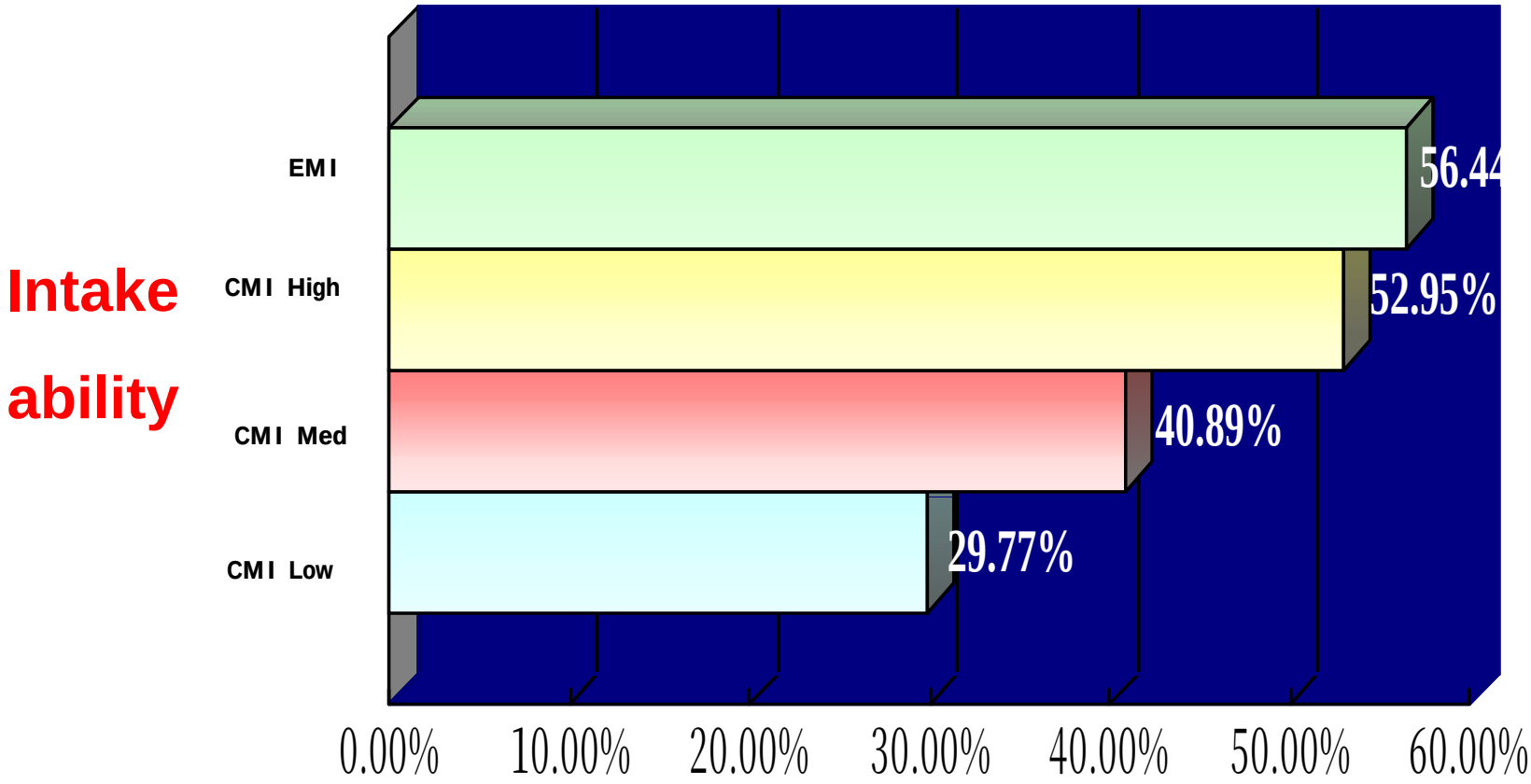


Using scientific knowledge

Intake ability

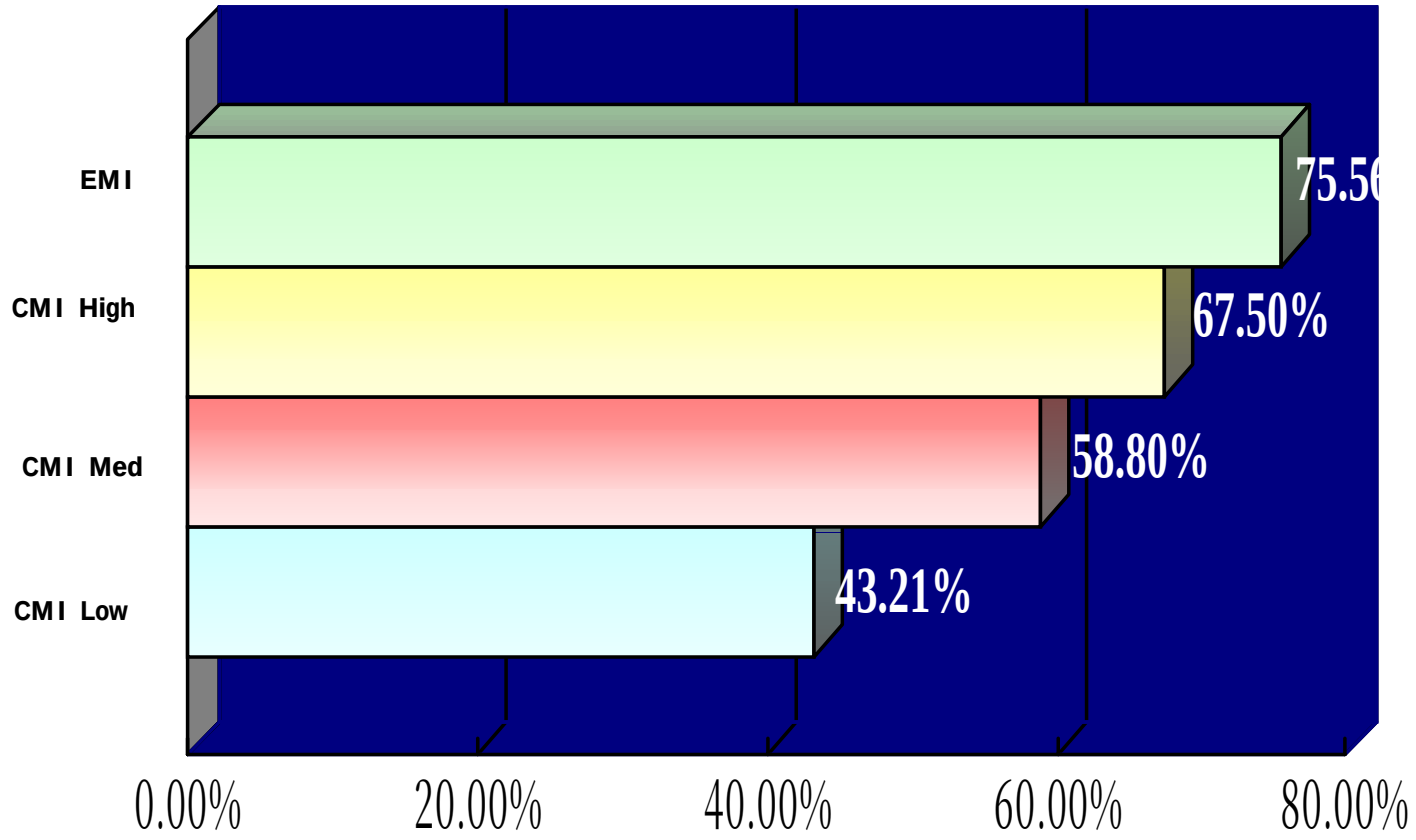


Recognising questions



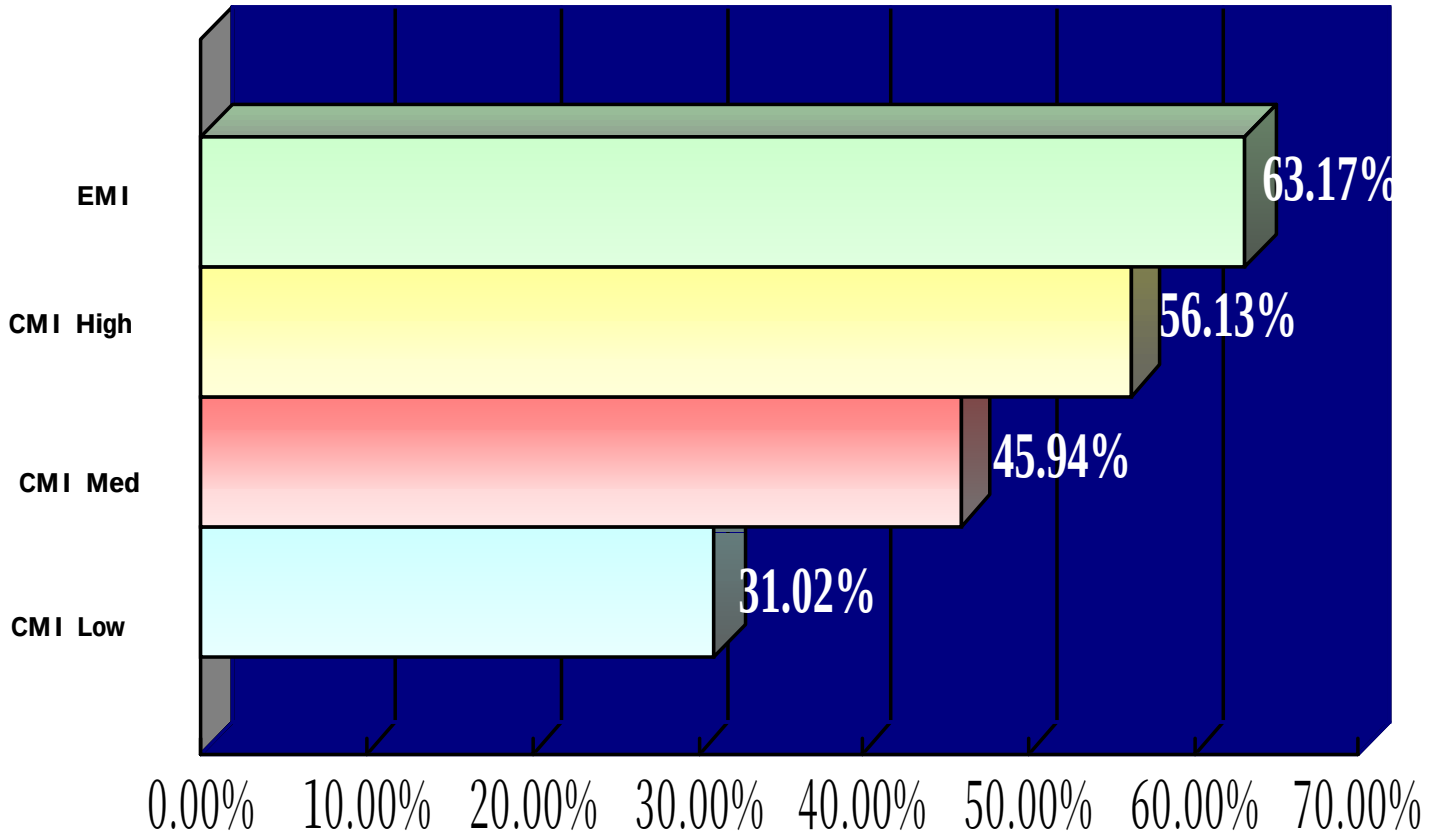
Identifying evidence

Intake ability

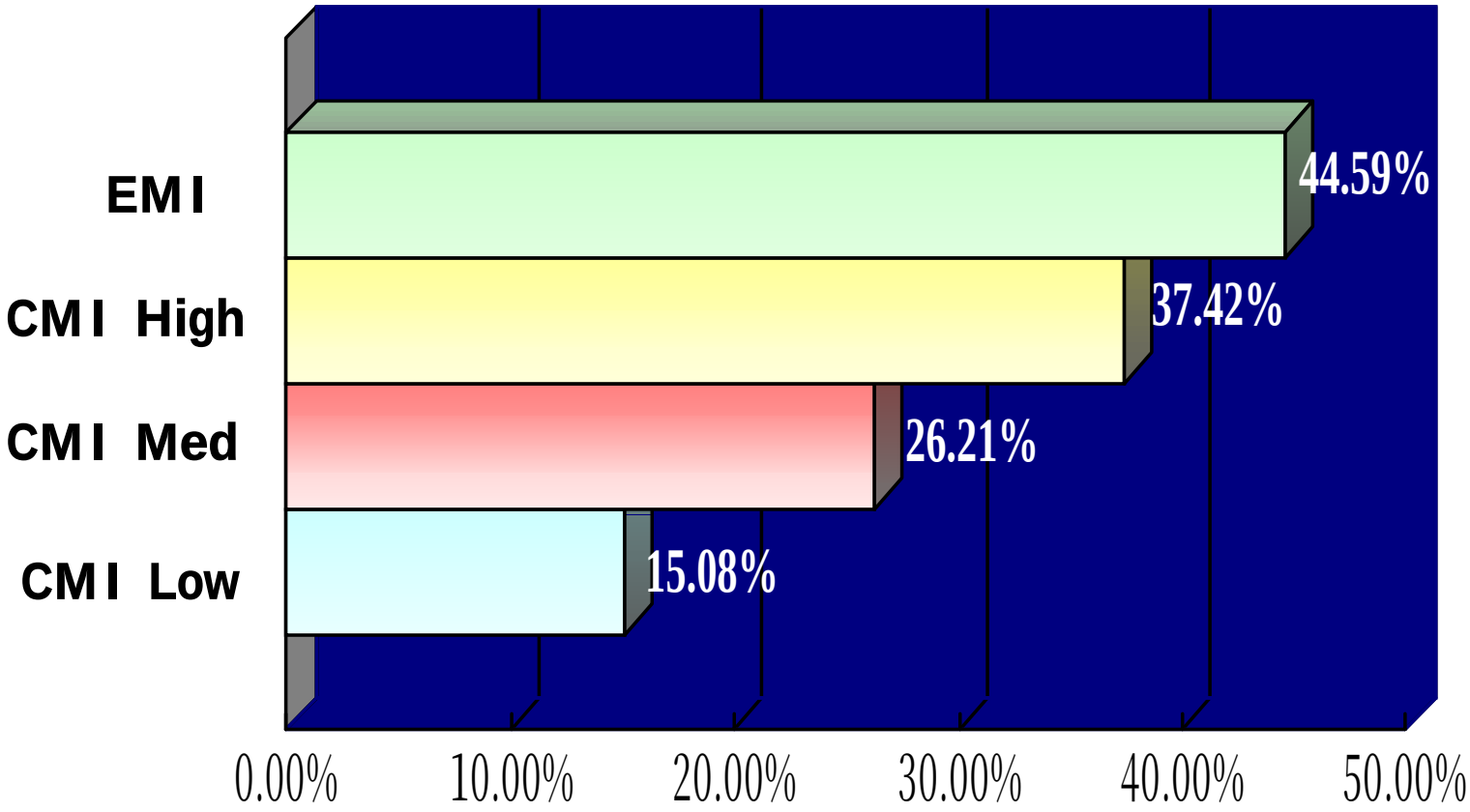


Drawing conclusions

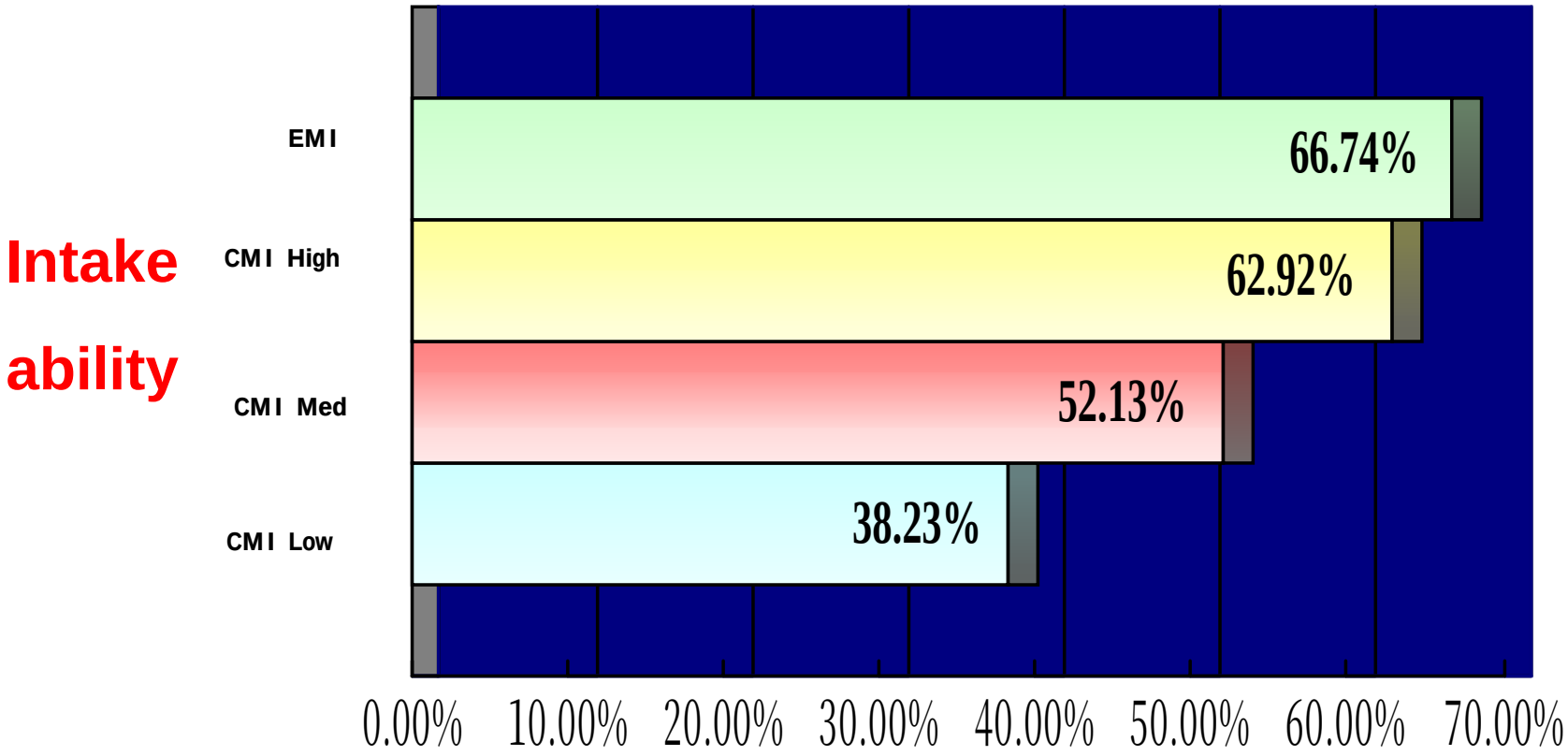
Intake ability



Communicating ideas



Overall performance



Do we provide an education that prepares our students for

adult life & life-long learning?