

# **PISA Information Booklet:**

## **Sample Questions from the PISA Assessment**

This booklet contains examples of PISA questions which are released to the public and based on material at [www.oecd.org/pisa](http://www.oecd.org/pisa). Questions are organized into units.

The percentage of students in Ireland and the OECD getting the question correct, and the content area and process assessed, are shown after each question.

More example questions, as well as the frameworks underpinning the PISA assessments, are available at the OECD's PISA website at [www.oecd.org/pisa](http://www.oecd.org/pisa).

**Prepared by the Educational Research Centre**

**Drumcondra, Dublin 9**

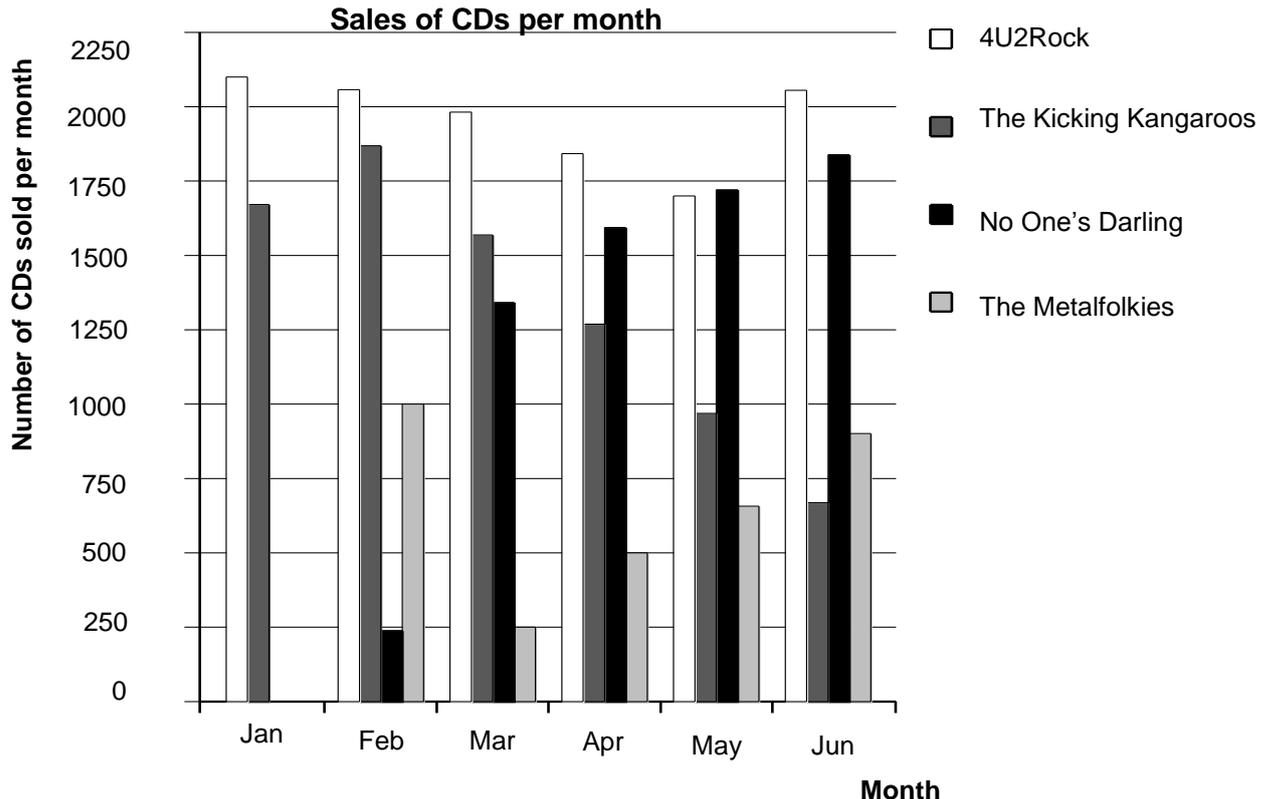
*September 2014*

## Mathematics Sample Questions

(Taken from Appendix B of the PISA 2012 National Report at [www.erc.ie/documents/p12main\\_report.pdf](http://www.erc.ie/documents/p12main_report.pdf))

### MATHEMATICS UNIT 1: Charts

In January, the new CDs of the bands *4U2Rock* and *The Kicking Kangaroos* were released. In February, the CDs of the bands *No One's Darling* and *The Metalfolkies* followed. The following graph shows the sales of the bands' CDs from January to June.



#### Charts – Question 1

How many CDs did the band *The Metalfolkies* sell in April?

- A 250
- B 500
- C 1000
- D 1270

Response	Ireland	OECD	Item Difficulty
Correct (option B)	84.2	87.3	Scale Score: 347.7 Proficiency Level <1
Incorrect	2.0	1.3	
Missing/Not reached	13.8	11.4	

Description: *Read a bar chart*

Mathematical content area: *Uncertainty and data*

Context: *Societal*

Process: *Interpret*

**Charts – Question 2**

In which month did the band *No One’s Darling* sell more CDs than the band *The Kicking Kangaroos* for the first time?

- A No month
- B March
- C April
- D May

Response	Ireland	OECD	Item Difficulty
Correct (option C)	77.2	79.5	Scale Score: 415.0 Proficiency Level 1
Incorrect	19.9	19.4	
Missing/Not reached	2.9	2.1	

Description: *Read a bar chart and compare the height of two bars*

Mathematical content area: *Uncertainty and data*

Context: *Societal*

Process: *Interpret*

**Charts – Question 3**

The manager of *The Kicking Kangaroos* is worried because the number of their CDs that sold decreased from February to June.

What is the estimate of their sales volume for July if the same negative trend continues?

- A 70 CDs
- B 370 CDs
- C 670 CDs
- D 1340 CDs

Response	Ireland	OECD	Item Difficulty
Correct (option B)	76.2	76.7	Scale Score: 428.2 Proficiency Level 2
Incorrect	23.6	23.3	
Missing/Not reached	0.2	0.0	

Description: *Interpret a bar chart and estimate the number of CDs sold in the future assuming that the linear trend continues*

Mathematical content area: *Uncertainty and data*

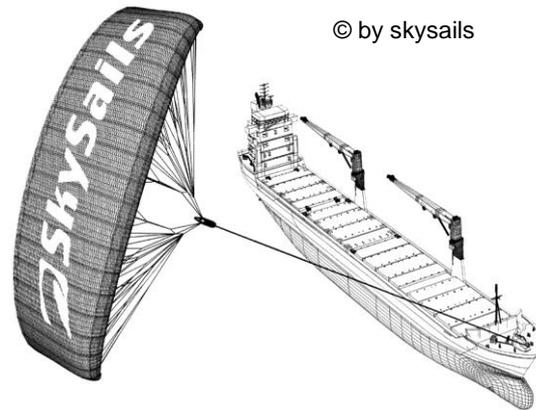
Context: *Societal*

Process: *Employ*

## MATHEMATICS UNIT 2: Sailing ships

Ninety-five percent of world trade is moved by sea, by roughly 50 000 tankers, bulk carriers and container ships. Most of these ships use diesel fuel.

Engineers are planning to develop wind power support for ships. Their proposal is to attach kite sails to ships and use the wind's power to help reduce diesel consumption and the fuel's impact on the environment.



### Sailing Ships – Question 1

One advantage of using a kite sail is that it flies at a height of 150 m. There, the wind speed is approximately 25% higher than down on the deck of the ship.

At what approximate speed does the wind blow into a kite sail when a wind speed of 24 km/h is measured on the deck of the ship?

- A 6 km/h
- B 18 km/h
- C 25 km/h
- D 30 km/h
- E 49 km/h

Response	Ireland	OECD	Item Difficulty
Correct (option D)	60.9	59.5	Scale Score: 511.7 Proficiency Level 3
Incorrect	37.4	37.4	
Missing/Not reached	1.7	3.1	

Description: *Apply calculation of percentage within a given real world situation*

Mathematical content area: *Quantity*

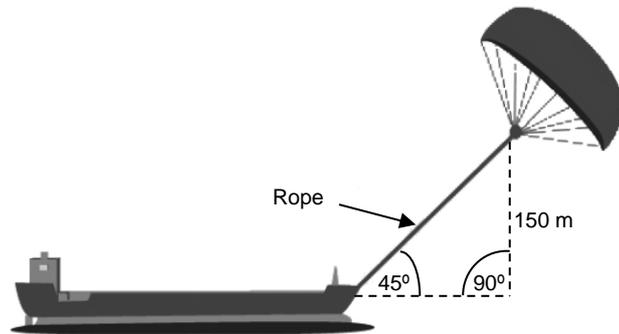
Context: *Scientific*

Process: *Employ*

### Sailing Ships – Question 2

Approximately what is the length of the rope for the kite sail, in order to pull the ship at an angle of  $45^\circ$  and be at a vertical height of 150 m, as shown in the diagram opposite?

- A 173 m
- B 212 m
- C 285 m
- D 300 m



Note: Drawing not to scale.  
© by skysails

Response	Ireland	OECD	Item Difficulty
Correct (option B)	47.8	49.8	Scale Score: 538.5 Proficiency Level 3
Incorrect	49.6	46.2	
Missing/Not reached	2.6	4.0	

Description: Use Pythagorean Theorem within a real geometric context

Mathematical content area: Space and shape

Context: Scientific

Process: Employ

## Reading Sample Questions

(Taken from Appendix B of the PISA 2012 National Report at [www.erc.ie/documents/p12main\\_report.pdf](http://www.erc.ie/documents/p12main_report.pdf))

### READING PASSAGE 1: IWANTTOHELP

Maika's Blog

Address: <http://www.maikasblog.com/index.html>

## Life Begins at 16

TUESDAY, JANUARY 1

Happy New Year!  
Just a quick post today to share my New Year's resolution with you. I have made up my mind that this is the year for volunteering (seriously).  
I am going to find a volunteer job.  
You may remember that last year I did a couple of short term volunteer jobs which were great, but this year I'd like a long-term position for about a year, so I can really make a difference to someone's life.  
I've found somewhere to start: [www.iwanttohelp.org](http://www.iwanttohelp.org) - has anyone else used this site?

[Comments](#)

SUNDAY, JANUARY 6

I had a heated debate over lunch today, when my friend Reiner started to quiz me on why I am REALLY interested in volunteering. He was adamant that the only way they can recruit people to volunteer these days is by telling them up front what they'll get out

**Site Contents**  
[Home](#)  
[About](#)  
[Contact](#)

**About Me**  
 Life begins at 16 is the personal blog of Maika M.  
[Read my complete profile.](#)

#### ***IWANTTOHELP – Question 1***

Read Maika's blog entry for January 1. What does the entry say about Maika's experience of volunteering?

- A She has been a volunteer for many years.
- B She only volunteers in order to be with her friends.
- C She has done a little volunteering but would like to do more.
- D She has tried volunteering but does not think it is worthwhile.

Response	Ireland	OECD	Item difficulty
Correct (option C)	89	85	Scale score: 362 Below proficiency level 2
Incorrect	10	14	
Missing/Not reached	2	1	

Situation: *Occupational*

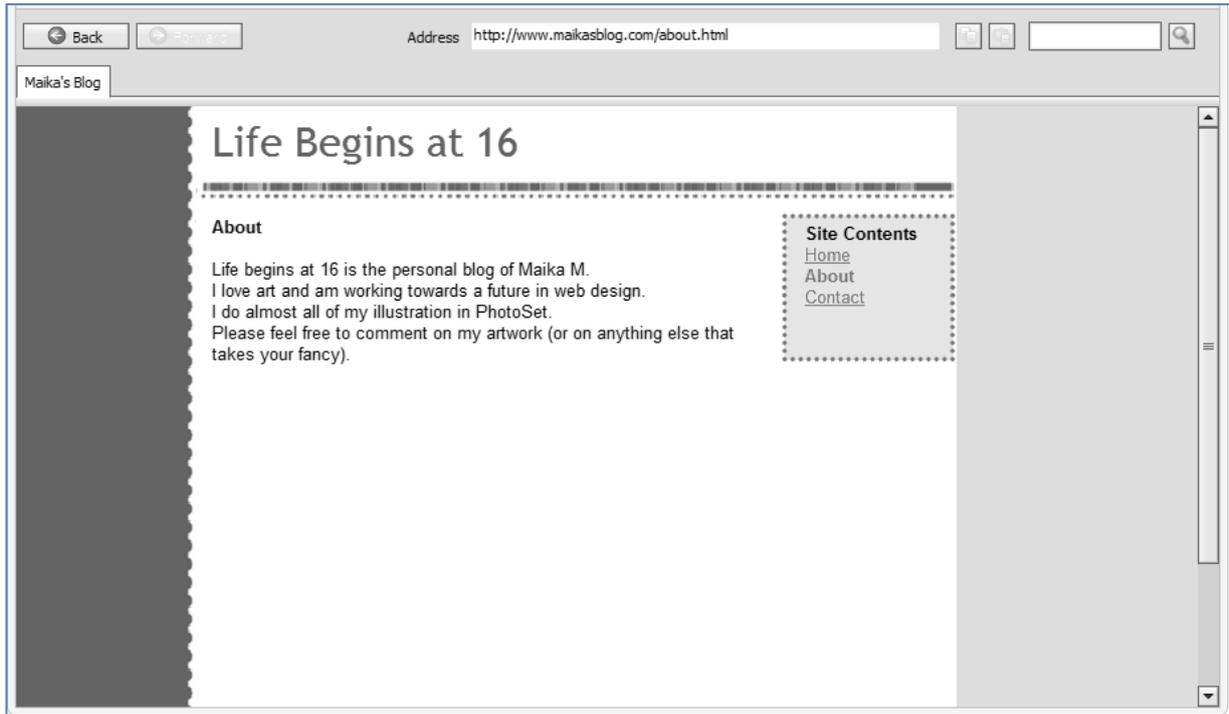
Environment: *Message-based*

Text Format: *Continuous*

Text type: *Description*

Aspect: *Access and retrieve – Retrieve information*

Question Format: *Multiple choice*



***I WANT TO HELP: Question 2***

Go to Maika's 'About' page.

What kind of work does Maika want to do when she leaves school?

- A Photography.
- B Web design.
- C Banking.
- D Social work.

Response	Ireland	OECD	Item difficulty
Correct (option B)	76	78	Scale score: 417 Proficiency level 2
Incorrect	22	20	
Missing/Not reached	2	2	

Situation: *Educational*

Environment: *Message-based*

Text Format: *Multiple*

Text type: *Description*

Aspect: *Access and retrieve – Retrieve information*

Question Format: *Multiple choice*

Back Forward Address <http://www.iwanttohelp.org/latest-opportunities.html>

Maika's Blog | [iwanttohelp.org](http://www.iwanttohelp.org)

 **iwanttohelp.org**  
The place to volunteer.

Home  
Latest Opportunities  
[Resources](#)  
[Site Map](#)

### Latest Opportunities

**What is Opportunity?**  
Join the hundreds of volunteers who use the **iwanttohelp** network every year to find an opportunity that suits them. Click on the links to see details of each opportunity for volunteers.

**What is Location?**  
Location is the geographic area in which an organisation is recruiting. Each opportunity needs volunteers from a specific city, county, state, or is recruiting nationally.

**What is Date?**  
The date range shows the period when a non-profit

Results 1-4

Opportunity	Organisation	Location	Date	Great For
<a href="#">Graphic Artist</a>	Federation of Galaxy Explorers	<a href="#">Online</a>	On-going	Teens, Seniors
<a href="#">Vegfest - a healthy vegetarian food festival</a>	Vegetarians United	Horizon Exhibition Centre	12 to 14 September	Teens, Groups, Seniors
<a href="#">Help fix up Twin Falls Track</a>	Team Green	Twin Falls Track	27 September to 3 October	Teens, Groups
<a href="#">Upway Primary</a>	Big Brothers, Big Sisters	Upway Primary	On-going	Teens, Seniors

Back Forward Address <http://www.iwanttohelp.org/latest-opportunities/school-e-mail.html>

Maika's Blog | [iwanttohelp.org](http://www.iwanttohelp.org)

 **iwanttohelp.org**  
The place to volunteer.

Home  
Latest Opportunities  
[Resources](#)  
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### E-mail this Opportunity to a Friend!

**Did You Know?**  
**iwanttohelp** is a non-profit organisation. Every year we help hundreds of volunteers of all ages to make contact with non-profit and community organisations. We rely on public donations to support our work.

**Upway Primary School - Work with kids**

E-mail this volunteer opportunity to a friend. Complete the form below (don't forget to include your friend's e-mail address!) and click 'Send'.

E-mail address:

Subject:

Message:

Back Forward Address <http://www.iwanttohelp.org/latest-opportunities/school.html>

Maika's Blog | [iwanttohelp.org](http://www.iwanttohelp.org)

 **iwanttohelp.org**  
The place to volunteer.

Home  
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[Site Map](#)

### Opportunity Details

**Find a Volunteer Opportunity**  
Join the hundreds of volunteers who use the **iwanttohelp** network every year to find an opportunity that suits them. Search for an opportunity now!  
[Latest Opportunities](#)

**Upway Primary School - Work with kids**

**Organisation:** Big Brothers, Big Sisters  
**Date:** On-going  
**Estimated Time:** 1 hour per week  
**Location:** Upway Primary School  
**Interest Area:** Children and Youth, Community, Education and Literacy

**Description**  
The School-Based Mentoring Programme is an innovative approach created by Big Brothers, Big Sisters to reach a more diverse population of children. The programme is designed to foster the academic development of young people, as well as to improve social skills. The volunteer meets with the student on the school campus, once a week, for one hour, during school hours, for a minimum of one year. It is our

### ***IWANTTOHELP – Question 3:***

Read Maika’s blog for January 1. Go to the *iwanttohelp* site and find an opportunity for Maika. Use the email button on the ‘Opportunity Details’ page for this opportunity to tell Maika about it. Explain in the email why the opportunity is suitable for her. Then send your email by clicking on the ‘Send’ button.

*Examples of correct answers (full credit):*

Students get credit for locating the place to set up and send the email and refer to ongoing position or future or web design or art, e.g.

You're a great artist and it is ongoing - you said you wanted a longer type of work right?

It's ongoing and it would help you get experience for your future.

You are obviously interested in graphic design, and want to pursue this when you finish school, and you would also love to volunteer. This would be a great opportunity to do both these things, and will look great on your CV too!

*Examples of correct answers (partial credit):*

Students get credit for locating the place to set up and send the email and the message in the email is vague, incomplete, irrelevant or missing.

*Examples of incorrect answers:*

Other responses.

Response	Ireland	OECD	Scale score	Proficiency level
Full credit	49	44	567	4
Partial credit	15	14	525	3
Incorrect	3	5		
Missing/Not reached	33	37		

Situation: *Educational*

Environment: *Mixed*

Text Format: *Multiple*

Text type: *Not specified*

Aspect: *Complex*

Question Format: *Open constructed response*

## READING PASSAGE 2: Smell

Smell - Global Search - E006P01 - Internet Browser

Address <http://www.globalsearch.com>

Global Search

# GLOBAL SEARCH

smell

- Smell: A Guide**  
How does **smell** work? A guide for biology students ... Current Research Projects ...  
[www.biology.litternuni.edu.au/smell/index.html](http://www.biology.litternuni.edu.au/smell/index.html)
- Smell - The Online Encyclopaedia**  
... sense of **smell**. Humans and animals use cues... a code **smell** is a symptom in the source code of a ...  
[www.en.onlineencyclopaedia.org/Smell](http://www.en.onlineencyclopaedia.org/Smell)
- Food in the news**  
The **smell** of pizza can change people's behaviour. Researchers continue to show the power behind our sense of **smell**...  
[www.whatsinthenews.com/articles/inn.asp?id=4381](http://www.whatsinthenews.com/articles/inn.asp?id=4381)
- Psychology Now**  
Get a Free Preview Issue of Psychology Now Magazine and Save Up to 61% ... while the **smell** of lemon led to ...  
[www.psychologynow.com/articles/id=672.html](http://www.psychologynow.com/articles/id=672.html)

Smell - Smell: A Guide - E006P02 - Internet Browser

Address [www.biology.litternuni.edu.au/smell/index.html](http://www.biology.litternuni.edu.au/smell/index.html)

Global Search Smell: A Guide

# SMELL: A GUIDE

Research and teaching information

SMELL TASTE SIGHT HEARING TOUCH

## The Role of Smell

The role of smell is to give information about the environment. Sometimes our sense of smell can warn of potential dangers. For example, the smell of smoke indicates fire. Sometimes it gives more general information, for example, whether or not there is food nearby. It can also give information about the identity of other living creatures. We all have our own uniquely identifiable smell (some more pleasant than others!).

Dogs can use smell to distinguish between garments worn by non-identical twins (but not those of identical twins - presumably because they smell identical). Children can distinguish their siblings from other children of the same age, again using smell.

Elephants' sense of smell is considered to be better than that of any other land mammal. Animal trainers have been making use of their powerful sense of smell to train them

Smell

- The Role of Smell
- Current Research Projects

Teaching

- Biology of the Senses
- Other Organs

**Smell – Question 1:**

Go to the ‘Smell: A Guide’ web page. Which of these statements best expresses the main idea on this page?

- A Smell can interfere with normal patterns of behaviour.
- B Smell warns humans and animals of danger.
- C The primary purpose of smell is to help animals to find food.
- D The development of smell takes place early in life.
- E The basic function of smell is recognition.

Response	Ireland	OECD	Item difficulty
Correct (option E)	37	42	Scale score: 572 Proficiency level 4
Incorrect	59	54	
Missing/Not reached	4	4	

Situation: *Educational*

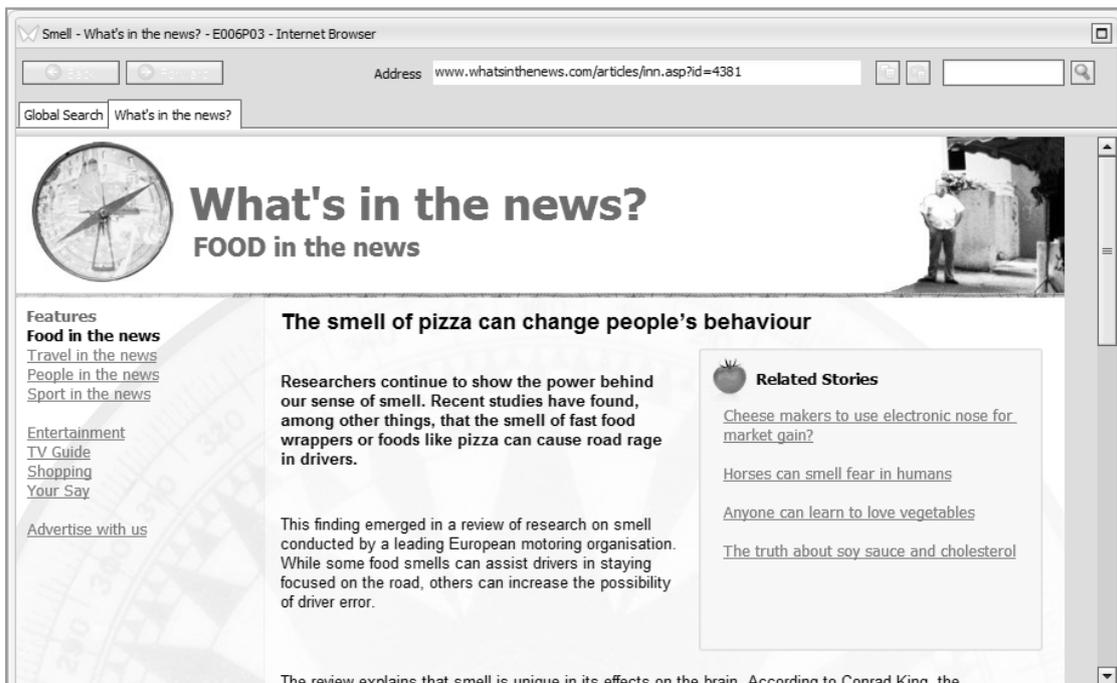
Environment: *Authored*

Text Format: *Multiple*

Text type: *Exposition*

Aspect: *Integrate and Interpret – Form a broad understanding*

Question Format: *Multiple choice*



**Smell – Question 2:**

There is information about the smell of lemon on the pages ‘Food in the news’ and ‘Psychology Now’.

Which statement summarises the conclusions of the two studies about the smell of lemon?

- A Both studies suggested that the smell of lemon helps you work quickly.
- B Both studies suggested that most people like the smell of lemon.
- C Both studies suggested that the smell of lemon helps you to concentrate.
- D Both studies suggested that females are better at detecting the smell of lemon than males.

Response	Ireland	OECD	Item difficulty
Correct (option C)	61	64	Scale score: 485 Proficiency level 3
Incorrect	34	31	
Missing/Not reached	5	5	

Situation: *Educational*

Environment: *Authored*

Text Format: *Multiple*

Text type: *Exposition*

Aspect: *Integrate and Interpret – Develop an interpretation*

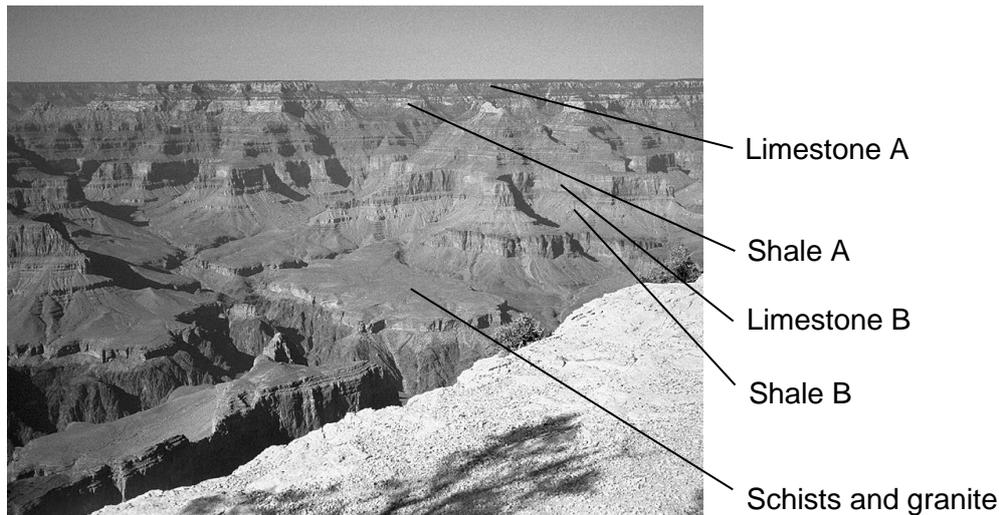
Question Format: *Multiple choice*

## Science Sample Questions

(Taken from Appendix B of the PISA 2012 National Report at [www.erc.ie/documents/p12main\\_report.pdf](http://www.erc.ie/documents/p12main_report.pdf))

### SCIENCE PASSAGE 1: The Grand Canyon

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.

#### **The Grand Canyon – Question 1**

About five million people visit the Grand Canyon national park every year. There is concern about the damage that is being caused to the park by so many visitors. Can the following questions be answered by scientific investigation? Circle 'Yes' or 'No' for each question.

<i>Can this question be answered by scientific investigation?</i>	<i>Yes or No?</i>
How much erosion is caused by use of the walking tracks?	Yes / No
Is the park area as beautiful as it was 100 years ago?	Yes / No

Response	Ireland	OECD	Item Difficulty
Correct (Yes, No)	74	61	Scale Score: 485 Proficiency Level: 3
Incorrect	25	37	
Missing/Not reached	1	2	

Situation: *Social*

Aspect: *Identifying scientific issues; Scientific enquiry*

Question format: *Complex multiple choice*

### **The Grand Canyon – Question 2**

The temperature in the Grand Canyon ranges from below 0 °C to over 40 °C. Although it is a desert area, cracks in the rocks sometimes contain water. How do these temperature changes and the water in rock cracks help to speed up the breakdown of rocks?

- A Freezing water dissolves warm rocks.
- B Water cements rocks together.
- C Ice smoothes the surface of rocks.
- D Freezing water expands in the rock cracks.

Response	Ireland	OECD	Item Difficulty
Correct (option D)	87	68	Scale Score: 451 Proficiency Level: 2
Incorrect	11	29	
Missing/Not reached	2	3	

Situation: *Social*

Aspect: *Explaining phenomena scientifically; Earth and space systems*

Question format: *Multiple choice*

### **The Grand Canyon – Question 3**

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.

Response	Ireland	OECD	Item Difficulty
Correct (option C)	70	76	Scale Score: 411 Proficiency Level: 2
Incorrect	26	20	
Missing/Not reached	4	4	

Situation: *Social*

Aspect: *Explaining phenomena scientifically; Earth and space systems*

Question format: *Multiple choice*

## SCIENCE PASSAGE 2: Acid Rain

Below is a photo of statues called Caryatids that were built on the Acropolis in Athens more than 2500 years ago. The statues are made of a type of rock called marble. Marble is composed of calcium carbonate. In 1980, the original statues were transferred inside the museum of the Acropolis and were replaced by replicas. The original statues were being eaten away by acid rain.



### Acid Rain – Question 1

Normal rain is slightly acidic because it has absorbed some carbon dioxide from the air. Acid rain is more acidic than normal rain because it has absorbed gases like sulfur oxides and nitrogen oxides as well. Where do these sulphur oxides and nitrogen oxides in the air come from?

*Examples of correct answers (full credit only):*

Gives any one of car exhausts, factory emissions, burning fossil fuels, or similar, or just refers to pollution.

*Examples of incorrect answers:*

Responses that do not mention 'pollution' and do not give a significant cause of acid rain.

Response	Ireland	OECD	Item Difficulty
Correct	70	58	Scale Score: 506 Proficiency Level: 3
Incorrect	21	26	
Missing/Not reached	9	16	

Situation: *Social*

Aspect: *Explaining phenomena scientifically; Physical systems*

Question format: *Short constructed response*

### **Acid Rain – Question 2**

The effect of acid rain on marble can be modelled by placing chips of marble in vinegar overnight. Vinegar and acid rain have about the same acidity level. When a marble chip is placed in vinegar, bubbles of gas form. The mass of the dry marble chip can be found before and after the experiment.

A marble chip has a mass of 2.0 grams before being immersed in vinegar overnight. The chip is removed and dried the next day. What will the mass of the dried marble chip be?

- A Less than 2.0 grams
- B Exactly 2.0 grams
- C Between 2.0 and 2.4 grams
- D More than 2.4 grams

Response	Ireland	OECD	Item Difficulty
Correct (option A)	68	67	Scale Score: 460 Proficiency Level: 2
Incorrect	30	31	
Missing/Not reached	2	2	

Situation: *Personal*

Aspect: *Using scientific evidence; Physical systems*

Question format: *Multiple choice*

### **Acid Rain – Question 3**

Students who did this experiment also placed marble chips in pure (distilled) water overnight.

Explain why the students include this step in their experiment.

*Examples of correct answers (full credit only):*

Response explains that the students used water to show that acid (vinegar) is necessary for the reaction.

*Examples of incorrect answers:*

Refers to a comparison with the vinegar and marble test, without clarifying that vinegar is necessary for the reaction; other insufficient, vague, or irrelevant responses.

Response	Ireland	OECD	Item Difficulty
Correct	23	14	Scale Score: 717 Proficiency Level: 6
Incorrect	67	69	
Missing/Not reached	10	17	

Situation: *Personal*

Aspect: *Identifying scientific issues; Scientific enquiry*

Question format: *Open constructed response*